tinbergen institute

Program of the Graduate School

MPhil and PhD program in
Economics, Econometrics and Finance 2017/2018

July 2017

Erasmus University Rotterdam
Erasmus School of Economics

University of Amsterdam
Faculty of Economics and Business

Vrije Universiteit Amsterdam
Faculty of Economics and Business Administration

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Preface

It is a pleasure to welcome you to a new year of graduate studies at the Tinbergen Institute (TI), the graduate school and research institute of the economics faculties of the Erasmus University Rotterdam, the University of Amsterdam, and the VU University Amsterdam. The TI MPhil program is a two-year research master in economics, econometrics and finance that is fully dedicated to preparing students for PhD thesis research.

In its first year students receive rigorous training in the core microeconomics, macroeconomics (and finance) and econometrics. In its second year students specialize in their choice from the institute's many fields of research through field course work and MPhil thesis research. In the first year of the MPhil program students have the possibility to specialize. Students with a strong background in econometrics can choose the advanced econometrics track. Students who aim to pursue a major in finance substitute two core courses in macroeconomics by two courses in finance.

The three faculties participating in Tinbergen Institute have three-year PhD positions available for students who have completed the TI MPhil program. Most students who perform well in the MPhil program find a supervisor at one of the three faculties (usually the MPhil thesis supervisor also acts as PhD supervisor) and continue in a PhD track in Tinbergen Institute.

TI offers job market training to PhD students in the last year of their appointment. This training program consists of workshops where students learn how to prepare for the academic job market, followed by mock interviews in which students learn to present themselves and their research in front of a committee.

Finally, we would like to draw your attention to the annual TI Lectures Series. Also this year, we invited leading researchers who will teach 3-day lectures to an audience of TI students. Esther Duflo of the Massachusetts Institute of Technology will give the Economics Lectures and students will have the opportunity to participate in the TI Econometrics Lectures.

Rotterdam, July 2017

Andreas Pick
Director of Graduate Studies

Contents

1. Tinbergen Institute Graduate School and Research Institute

Founded in 1987, Tinbergen Institute (TI) is the graduate school and research institute in economics, econometrics and finance of the Erasmus School of Economics of Erasmus University Rotterdam, the Faculty of Economics and Business Administration of VU University Amsterdam, and the Faculty of Economics and Business of the University of Amsterdam.

The ***TI Graduate School*** offers two years (120 ects) of intensive PhD-level coursework in its Master of Philosophy (MPhil) program. The TI MPhil program has been accredited by the Accreditation Organisation for the Netherlands and Flanders (NVAO) and fits into the framework of the Bologna model and the European Higher Education Area. Students who complete the TI MPhil program are awarded a legally-protected MSc degree in economics.

All courses in the TI program are taught in English and mostly on the institute's premises in Amsterdam and Rotterdam. Students can also participate in a broad range of related activities organized by and at the institute, such as reading groups, seminars, workshops and conferences. Details about the contents of the program and admission requirements follow in later sections of this brochure.

The MPhil program's high standards are guaranteed by selecting teaching staff from the best researchers of the three faculties participating in the institute and by inviting internationally renowned experts to serve as guest lecturers in their fields of research. The program's high quality is also maintained by carefully selecting only the best students from a large international pool of applicants. Each year up to around 20-30 students are admitted to the TI MPhil program. Altogether, some 220 MPhil and PhD students are currently affiliated to the institute.

Students who have completed the institute's MPhil program should have a thorough, up-to-date knowledge of the theory, empirics, and econometric methodology of economics, econometrics and finance, respectively. They should be able to read and understand top academic journals and to contribute to scientific discussions. Students should have sufficient knowledge, insight and skills to carry out independent research in economics or finance, initially under appropriate academic supervision. The MPhil thesis, which serves as the final exam of the MPhil program, is a first test of this. It should be written as a draft of a research paper that can be submitted to an international, peer-reviewed journal. It is supervised by a research fellow of the institute and can serve as a starting point for the PhD thesis.

The MPhil program is fully dedicated to preparing students for PhD thesis research in the three faculties participating in the institute.

Students who successfully complete the MPhil program usually transfer to a 3-year PhD position at one of the faculties and are offered full time employment positions with all the benefits of a good salary. PhD students primarily spend their time on writing research papers for the PhD thesis, on participation in conferences, workshops and seminars, and on longer study visits abroad.

The ***TI Research Institute*** aims to stimulate fundamental and applied research in economics at the three participating universities and to organize an excellent research training environment for the institute's students. The research program consists of eight themes, covering the whole spectrum of economic analysis, from theoretical to empirical research and econometric methods:

- Behavioral and Experimental Economics (BEE)
- Cooperative Behavior, Strategic Interaction, and Complex Systems (CSC)
- Econometrics and Operations Research (ECTOR)
- Finance (FIN)
- Macroeconomics and International Economics (MIE)
- Labor, Health, Education and Development (LHED)
- Organizations and Markets (OM)
- Spatial, Transport, and Environmental Economics (STEE)

The cooperation between the three economics faculties in the institute offers many benefits. The best economists from the three participating universities are affiliated to TI as research fellows. TI offers them facilities for organizing conferences and seminars, and for inviting foreign guest researchers for short or long stays. TI has offices in both Amsterdam and Rotterdam, including seminar rooms and a dedicated support staff. The graduate (MPhil and PhD) students also have their own shared office space. The research atmosphere is international, active and lively.

Small-scale locations and the informal atmosphere at TI contribute to a wealth of contacts between students, teachers, research fellows, and visitors. The MPhil students often collaborate on various assignments and become a close-knit group. Yet, they also enjoy regular contacts with more senior (PhD) students. At both locations (Amsterdam and Rotterdam), weekly student lunch seminars are organized. During these seminars students present their work and discuss their progress.

To disseminate research results and to enhance discussion among colleagues, Tinbergen Institute publishes a discussion paper series which can be found at www.tinbergen.nl/discussionpapers.

2. General information on the MPhil/PhD program

2.1 Application procedure

Applications for September 2018 enrolment will be taken from October 2017 and should be submitted via the online application form on the website.

The application deadlines for enrolment in September 2018 are:

- Priority deadline: February 1, 2018
- Rolling admission for non-EEA nationals, until April 1, 2018
- Rolling admission for EEA nationals, until May 1, 2018 (or earlier if full capacity has been reached)

The institute and the international offices of the participating universities will help students who are admitted with immigration procedures, financial arrangements, housing, etc.

Questions about and comments on the application procedure should be directed to the Admissions Officer at applications@tinbergen.nl.

2.2 Admission requirements

The MPhil program is a selective program geared towards excellent students who want to pursue a PhD in economics, econometrics or finance at TI. Admissions are highly selective and competitive. A maximum of around 20-30 students may enrol each year. Students are selected by TI's Admission Board in a rigorous and careful process according to the following guidelines:[1]

1. Students must have at least a Bachelor's diploma, preferably in economics, econometrics, mathematics or physics. The Bachelor's program should have been completed before the start of the MPhil program.

2. Valid GRE (revised) General Test results are required from all (including Dutch) applicants. Successful applicants typically perform among the top-10% of test-takers on the quantitative part of the GRE. Tinbergen Institute's code number for the GRE is 3811.

3. An excellent command of English is crucial. Students whose native language is not English are therefore required to demonstrate English proficiency in one of two ways:

    a. by holding a degree from a Dutch university or an institution at which English is the language of instruction, or

    b. by scoring at least 100 on the TOEFL iBT test or 7 on the IELTS (International English Language Testing System) test. TI's code number for the TOEFL is 3811.

4. Students should be strongly motivated to pursue a PhD in economics, econometrics or finance at the institute. Such motivation will be assessed by a written Statement of Research Interests and Purpose of Study.

5. Applications should include at least two letters of recommendation supporting the capability and aspirations of the applicant.

[1] Details of these and other regulations concerning the MPhil program can be found in the program's Academic and Examination Regulations, which is available from the institute's intranet. In case of conflicts between this brochure and the Academic and Examination Regulations, the text of the Academic and Examination Regulations is binding.

More details about additional admission requirements can be found on TI's website (http://www.tinbergen.nl/prospective-students-application-admission-deadlines/).

2.3 Tuition fees, registration at the universities

Students in the MPhil program are registered at the Erasmus University Rotterdam, the University of Amsterdam or Vrije Universiteit Amsterdam. The university where the student is registered awards the MSc degree. A tuition fee is charged to all MPhil students. Tuition fees are due until all MPhil examinations, including the MPhil thesis, are passed. The tuition fees are determined annually by the Dutch government and the universities.

The annual tuition fee for the academic year 2017-2018 is:

- EEA national € 2,006
- non-EEA national € 12,000 (€ 15,000 for 2018-2019)
- students holding a Dutch MSc degree € 12,000 (€ 15,000 for 2018-2019)

Tinbergen Institute recognizes that talented students who have already earned a Dutch master degree may be discouraged by the high tuition fee. Under certain conditions, TI will offer financial assistance to these students.

The institute supports students with various facilities, such as office space at TI in Rotterdam or Amsterdam and reimbursement of travel expenses between Amsterdam and Rotterdam for MPhil coursework.

2.4 Funding

Tinbergen Institute awards scholarships to selected students based on merit. Because the institute's resources are limited, prospective students are advised to apply for external funding as well (see e.g. www.grantfinder.nl).

Tinbergen Institute offers full or partial scholarships (covering the tuition fee, monthly installments and a contribution to health insurance costs) and tuition fee waivers (tuition fee and contribution to health insurance costs) to selected students. Scholarships and tuition waivers are granted by TI's Admission Board. Students who accept a TI scholarship or tuition waiver are obliged to sign a statement in which they declare to agree with the scholarship regulations.
Scholarships are never cumulative: TI will supplement external scholarships students may receive from an institution or governmental organization. Initially, a scholarship is granted for the program's first year (12 months) only.

Scholarships are paid to the student as long as the student actively participates in the program and as long as there is a reasonable expectation that the student will successfully complete the program according to the program's Academic and Examination Regulations. If a student is temporarily or permanently unable or unwilling to participate in the MPhil program, or if the Director of Graduate Studies asks the student to withdraw from the program because of unsatisfactory performance or misconduct, payment of the monthly installments may be discontinued. In case students withdraw from the program before the end of the academic year, students are required to cancel their registration with the university and to apply to the university for a (partial) refund of the tuition fees. Refunded fees will be repaid to TI, if a tuition waiver was part of the scholarship.

In order to maintain or be awarded a full scholarship in the second year of the program, students should fulfil the following requirements at the end of the first year of the program:

1. The student's weighted GPA for the core courses is 7.5 or higher at the end of course block IV of the first year of the program, and
2. Failed courses should be re-taken in the second year of the program. The scholarship will be immediately terminated in case the student fails the retake (a compensated 5 is considered as a sufficient result).

Students who do not meet these requirements may be awarded a tuition fee waiver or partial scholarship if funds are available.

The scholarship is conditional on active participation in the program, fulfilling assigned TA duties, and the likelihood of completing the MPhil program according to the program's Academic and Examination Regulations.

Government support is available for some groups of MPhil students
(see https://www.duo.nl/particulier/international-student/student-finance/how-does-it-work.jsp):

a. Full-time students who are Dutch nationals and are under 30 years of age may be eligible for student finance in the form of a loan, a student travel product and a supplementary grant (depending on parental income).
b. The same scheme is open for select groups of nationals of other countries.
c. Finally, EEA and Swiss nationals may be eligible for tuition fee restitution by the government.

For second-year students, additional funding is offered by the institute and the faculties through research and/or teaching assistantships. These jobs offer valuable teaching and research experience. The program's second year leaves ample time for MPhil thesis research, which could be connected to a research assistantship. The core (first-year) program leaves little or no time for any jobs.

2.5 PhD program

Students who perform well in the MPhil program usually transfer to the three-year PhD program.

Students are assisted in the transition to the PhD program and in finding one or more PhD thesis supervisors with whom they prepare a PhD thesis proposal. Ideally, but not necessarily, the MPhil thesis will be the basis of the PhD thesis proposal and the MPhil thesis supervisor will be the PhD thesis supervisor. The main PhD supervisor (the "*promotor*") should be a full professor in one of the three economics faculties.

Students admitted to the PhD program are typically employed by this faculty as a PhD researcher ("*promovendus*"). This is a full-time position that comes with all the benefits of employment, including a good salary. Thus, such PhD students are fully funded.

After completion of the MPhil program, students have complied with all coursework requirements of the graduate program and typically spend most or all of their time on PhD research. Nevertheless, students are most welcome to participate in additional field courses during the later (PhD) years of their studies at the institute. PhD students should register for all courses they would like to attend by means of the course registration form on TI's website (http://www.tinbergen.nl/online-registration-form-phd-students/). No costs will be charged for PhD students who have completed the MPhil program.

2.6 Job market training

Tinbergen Institute supports PhD students in preparing for the international (academic) job market by organizing presentation sessions (weekly lunch seminars and an annual PhD Jamboree), by providing a budget to participate in international job market events (usually the AEA meetings in the US) and by offering mock interview sessions. Requirements and details are announced in the Institute's Intranet.

See TI's placement record at the TI website: http://www.tinbergen.nl/recent-top-placements/

2.7 Lectures on Academic Integrity

Tinbergen Institute offers a course on Scientific Integrity as part of the mandatory curriculum for all MPhil and PhD students. Part of the course is the dilemma game which encourages students to discuss dilemmas and stimulates them to find solutions.

3. The MPhil program in 2017/2018

3.1 Course calendar 2017/2018

All regular TI courses are taught in blocks of eight weeks, with lectures during the first six (core courses) or seven weeks (field courses); the eighth week of each block typically serves as an exam week. Exception is block V. To accommodate all field courses and the two lecture series, this block is extended by 2 weeks.

Course attendance is mandatory; this applies to all core and field courses, to the English writing course, the Academic Integrity course and the MPhil research seminar series. Attendance is registered via attendance sheets. First-year (core) courses have weekly one-hour tutorials, taught by a teaching assistant, in which students work on and discuss homework assignments.

The schedule for 2017/2018 is

Block I **Week 36-43**	**Block II** **Week 44-52**	**Block III** **Week 1-9**	**Block IV** **Week 10-17**	**Block V** **Week 18-27**
Sep 4-8	Oct 30-Nov 3	Jan 1-5 *Christmas Holidays*	Mar 5-9	Apr 30-May 4 *Spring Break*
Sep 11-15	Nov 6-10	Jan 8-12	Mar 12-16	May 7-11 *Ascension Day*
Sep 18-22	Nov 13-17	Jan 15-19	Mar 19-23	May 14-18
Sep 25-290	Nov 20-24	Jan 22-26	Mar 26-30 *Good Friday*	May 21-25 *Whit Monday*
Oct 2-6	Nov 27-Dec 1	Jan 29-Feb 2	Apr 2-6 *Easter Monday*	May 28-Jun 1
Oct 9-13	Dec 4-8	Feb 5-9	Apr 9-13	Jun 4-8
Oct 16-20	Dec 11-15	Feb 12-16	Apr 16-20	Jun 11-15
Oct 23-27 *Exams*	Dec 18-22 *Exams*	Feb 20-23	Apr 23-27 *Exams*	Jun 18-22
	Dec 25-29 *Christmas Holidays*	Feb 26-Mar 2 *Exams*		Jun 25-29
				Jul 2-6
				Jul 9-13 *Exams*

3.2 Registration for and withdrawal from courses for MPhil students

First-year MPhil students do not have to register for core courses and the MPhil seminar series. In January, first-year students have to register for the field courses in block V by means of the online registration mode in OSIRIS.

Second- and higher-year MPhil students should register for field courses (and core courses they have to retake) using the online registration mode in OSIRIS (open around July 15, 2017). Registration deadline: August 15, 2017. Second-year MPhil students have to register for a full program of 10 field courses (excluding first-year field courses they have to retake) plus two extra courses as substitutes in case courses are cancelledcancellations.
After the start of the academic year, changes in the course registrations need explicit permission of the Director of Graduate Studies. Requests can be sent by email to courses@tinbergen.nl (see

Section 3.4). Requests should be made at least two weeks before the start of the block in which the course takes place and need approval of the prospective MPhil/PhD thesis supervisor.

3.3 First year of the MPhil program

In the first year of the MPhil program students have to complete 60 ECTS.[2] The first year Economics, Econometrics and Finance programs include 13 core courses (52 ECTS), 2 field courses (6 ECTS), the Principles of Programming in Econometrics course (1 ECTS), and the MPhil seminar series (1 ECTS).

At the start of the academic year, students choose one of the tracks: Economics, Econometrics or Finance. The choice of track will be discussed during the intake interview with the Director of Graduate Studies (to be scheduled in the first weeks of September). To a certain extent, exchange between the tracks is possible.

Students in the Econometrics track take Advanced Econometrics instead of Econometrics and Asymptotic Theory instead of Statistics. Students in the Finance track replace Macroeconomics II and III or Microeconomics II and III with Asset Pricing and Corporate Finance Theory. Students may combine the Econometrics and Finance track.

In block V, first-year students choose 2 field courses out of a selection listed in Section 3.3.1. Part of the examination of the first year field courses is a paper assignment.

All first-year students have to attend the MPhil seminar series. These seminars allow students to explore potential supervisors and fields of specialization, and vice versa, allow potential supervisors to scout talented students. See also Section 3.3.2.

At predetermined times throughout the first year, the DGS interviews students to discuss their progress in the program. After block V of the first year year, the institute's Examination Board issues a formal advice on continuation in the program to all first-year students. In general, only students who have earned at least 48 ECTS of first year's credits at the end of the first year and who attended the MPhil seminar series are advised to continue in the program (see Section 3.3.5 for information on grading, credits, and retakes in the core). In any case, students will only be admitted to second-year field courses when they have earned at least 48 core ECTS and meet any additional entrance requirements specific to each field course (see Section 4.1).

3.3.1 MPhil program and tracks: Economics, Econometrics, Finance

The standard first-year MPhil track in Economics consists of the following courses:

Code	Course name	Instructor(s)	ECTS	Block
TI1710	Microeconomics I (Individual Decision Making and General Equilibrium)	Karamychev/Tuinstra	4	I
TI1711	Microeconomics II (Game Theory)	Wakker/Moraga	4	II
TI1712	Microeconomics III (Information and Contract Theory)	Sloof/Visser	4	III
TI1713	Microeconomics IV (Behavioral Economics)	Wakker/Offerman	4	IV
TI1714	Macroeconomics I (Stochastic Neoclassical Growth Models)	Brügemann	4	II
TI1715	Macroeconomics II (Macroeconomic Policy)	Stoltenberg	4	III
TI1716	Macroeconomics III (Frictions and	Bartelsman/Gautier	4	IV

[2] Here, "ECTS" refers to course credits according to the European Credit Transfer System.

	Resource Allocation)			
TI1717	Macroeconomics IV (Financial Frictions in Macroeconomics)	Van Wijnbergen	4	V
TI1709	Mathematics	Wagener/Brinkhuis	4	I
TI1707	Statistics	Spreij	4	I
TI1701	Econometrics I	Fok	4	II
TI1702	Econometrics II	V.d. Klaauw/Lindeboom	4	III
TI1703	Econometrics III	Lasak	4	IV
TI143	Principles of Programming in Econometrics	Bos	1	0

Students with a sufficient background in statistics and/or econometrics (see Section 3.6) can replace Statistics and/or Econometrics I, II and III with:

Code	Course name	Instructor(s)	ECTS	Block
TI1708	Asymptotic Theory	Spreij		
TI1704	Advanced Econometrics I	Bos	4	II
TI1705	Advanced Econometrics II	Kleibergen/Pick	4	III
TI1706	Advanced Econometrics III	KoopmanBoswijk	4	IV

Students who are interested in finance can substitute the block III and IV courses in Macroeconomics or Microeconomics with:

Code	Course name	Instructor(s)	ECTS	Block
TI1718	Asset Pricing	Laeven/Vellekoop	4	III
TI1719	Corporate Finance Theory	Vladimirov	4	IV

In block V the Macro IV core course is compulsory and students choose two field courses out of the following list:

Code	Course name	Instructor(s)	ECTS	Block
TI119	Behavioral Finance	V.d. Assem/Peters/ Zwinkels	3	V
TI127	Complexity and Behavior	Hommes/Houba	3	V
TI154	Economics of Education	Plug/Oosterbeek	3	V
TI155	Experimental Economics	Sonnemans/V.d. Ven	3	V
TI034	International Economics	Klaassen/ Emami Namini	3	V
TI134	Spatial Economics	De Groot/V.d. Ploeg/ Verhoef	3	V
TI138	Topics in Organization and Markets	Onderstal/Swank	3	V

In both of the selected field courses, students will have to write a field paper.

On top of the above field courses, students are recommended to take one of the following TI lectures (if not for credits, attendance is highly recommended):

Code	Course name	Lecturer(s)	Block
TI175	TI Economics Lectures 2018	Duflo	V
TI176	TI Econometrics Lectures 2018	tba	V

Section 4.1 provides course details. Section 4.1 does not explicitly state the core courses' entrance requirements. However, later course blocks often build on earlier course blocks within, and occasionally across, each of the four core sequences: Microeconomics, Macroeconomics, Econometrics, and Advanced Econometrics.

Chronologically, by eight-week course blocks, this gives:

Block	Microeconomics/Macroeconomics/ Finance	Econometrics *or* Advanced Econometrics	Seminar
0		Principles of Programming	
I	Micro I (Ind. Decision and General Equilibrium)	Mathematics Statistics *or* Asymptotic Theory	Research Sem
II	Micro II (Game Theory) Macro I (DSGE Models)	Econometrics I *or* Adv. Ectr. I	Research Sem
III	Two courses out of the following: Micro III (Information and Contract Theory) Macro II (Policy) Finance I (Asset Pricing)*	Ectr. II *or* Adv. Ectr. II	Research Sem
IV	Two courses out of the following: Micro IV (Behavioral Economics) Macro III (Frictions) Finance II (Corporate Finance)*	Ectr. III *or* Adv. Ectr. III	Research Sem
V	Macro IV (Financial Frictions) Field course 1	Field course 2	

* Asset Pricing and Corporate Finance Theory have to be followed in combination.

3.3.2 MPhil research seminar series

The MPhil research seminars introduce the research groups at the 3 TI faculties to the first year MPhil students. In the seminars, TI fellows relate ongoing research projects in their research groups. Aim of the seminar series is to facilitate the matching process between students and prospective supervisors and to introduce researchers to students who they did not (yet) encounter in the class room.

The research seminars are organized at TI Amsterdam and TI Rotterdam. Attendance is mandatory and will be checked by means of attendance sheets. Signing off for fellow students is considered fraud and will disqualify the signee for the 1 ECTS for the seminars.

After having attended all seminars in the series, students select a research topic and address a TI research fellow who is not teaching in the first year of the program. Students write a research proposal (2-3 pages) and discuss the proposal with the research fellow.

Requirement for the MPhil seminar series (1 ECTS) is attendance and a pass for the research proposal.

3.3.3 Grading, credits, and retakes in the core

All core courses are graded on a 1-10 scale, where 1 indicates very poor performance, 6 is the lowest passing grade, and 10 refers to outstanding performance.[3] The final grade for a course block is round off to one decimal as .0 or .5, with the following exceptions: any grade between 5.0

[3] Dutch grades are supposed to reflect performance according to some external standard and are not fully calibrated to reflect relative performance in the class.

and 5.5 is round off to a 5; a 5.5 is round off to 6; a 0.5 does not exist. Grades for homework or midterm examinations do not have to be full or half grades.

All core course blocks will be concluded by a sit-in examination. Apart from the sit-in examination, results of homework assignments form part of the examination and contribute to the final grade for a course block. The final grade for the course block is composed of the average grade for the homework assignments (15%) and the grade for the sit-in examination (85%).

Exams are typically graded within 15 working days, and before July 15. Students can review their graded exam papers at the local TI secretariat for up to four weeks after receiving their grade.

Students obtain 4 ECTS credits for each core course block that they have passed (grade 6 or higher). Within the econometrics/advanced econometrics core course sequence students may compensate at most one 5 with a 7.5 or higher. Within the core course sequences microeconomics/macroeconomics/finance students may compensate at most 2 fives with a 7.5 or higher for each five, obtained in another core course block in the same area (micro, macro or finance) for which the 5 was obtained. The compensation rule applies across years, except for students who have not earned at least 48 ECTS of first year's credits by August 1 of the first year and/or have not completed the seminar series.
For students who started the program in 2016, the compensation rule in the AER 2016/17 applies.

Tinbergen Institute does not schedule retakes. Failed exams in the 1st year cannot be retaken in the same academic year. Instead, students should retake failed 1st year course blocks in their second year in the program. Students cannot resit examinations that they have already passed.

3.4 Second year of the MPhil program

This section focuses on the second year of the MPhil program.

Students should comply with the field-course requirements of the academic year that coincides with their second year in the program. Thus, the rules in this section apply to the 2016 cohort of MPhil students.

In the MPhil program's second year, students have to choose a research major and pass 4 field courses within this research major. The research majors (corresponding to the the TI research groups) are the following:

1. Behavioral and Experimental Economics (BEE)
2. Cooperative Behavior, Strategic Interaction, and Complex Systems (CSC)
3. Econometrics and Operations Research (ECTOR)
4. Finance (FIN)
5. Macroeconomics and International Economics (MIE)
6. Labor, Health, Education and Development (LHED)
7. Organizations and Markets (OM)
8. Spatial, Transport, and Environmental Economics (STEE)

Students who wish to graduate in the Econometrics track should choose the Econometrics track in the first year (see above) and take their research major in Econometrics (ECTOR); students who wish to graduate in the Finance track should choose the Finance track in the first year (see above) and take their research major in Finance (FIN).
In principle, all major options are open as long as students meet the entrance requirements determined for field courses within that major.

In the second year, students have to

(i) complete 10 courses (30 ECTS) of specialized coursework, taking at least 4 courses in their research major field (the "field requirement").

Courses in each of the eight fields that count towards the fields requirement (field courses) are listed in Section 3.4.1. The remaining course credits can be obtained by following any other field courses listed in Section 3.4.1 or external courses and workshops not listed in Section 3.4.1 (see Section 3.4.4).

Tinbergen Institute may cancel field courses with less than five registrations.

To limit uncertainty about field-course offerings to a minimum, there are strict rules for registration by TI students (Section 3.2.). Before the start of the academic year, students should register for 10 field courses and 2 additional courses. The additional courses may substitute courses that are cancelled due to too few registrations. When composing the field course program, students should keep in mind whether their program satisfies the field requirement.

Once the academic year has started, students need explicit approval from the Director of Graduate Studies to sign up for or withdraw from field courses.

In General, students are only allowed to register for a field course if they have earned at least 48 ECTS of first year's credits including the 1 credit for the seminar series. Furthermore, students have to meet the entrance requirements specified for a course they want to register for (see Section 4.3).
The requirement for the 2nd year is to complete 10 field courses for 30 ECTS in total. Tinbergen Institute allocates typically 3 credits to any field course, including external courses, irrespective of the number of credits allocated to the same course elsewhere. This also holds for TI core courses followed as field course by students for whom this course was not part of their standard core.
The philosophy underlying this is that we require students to take 10 different courses in their second year to specialize in their areas of interest as well as to broaden their perspective. To avoid any discussion about the relative load of different credits in different programs, we adopt a simple uniform policy of allocating 3 ECTS to every field course.

(ii) write and publicly defend an MPhil thesis.

The MPhil thesis (30 ECTS; see Section 3.4.6) is the final examination of the MPhil program.

The thesis can only be defended if all other course work has been completed.

(iii) attend the Academic Writing course, to be organized in block I/II.

TI will offer a mandatory course in Academic Writing in the second year of the MPhil program. This course consists of two workshops. Under the guidance of a professional editor, students will learn to use some basic practical tools for evaluating, structuring and revising their writing. Each of the workshops features both instruction and opportunities to put theory into practice. Furthermore, students will get written feedback on their writing. For this purpose, one of the block V paper assignments has to be submitted to the teacher of the writing course.

(iv) attend the lectures on Academic Integrity. The purpose of these lectures is to stimulate students to think about professional behavior in science.

Students are strongly advised to complete the MPhil program before the end of the second academic year (i.e. in 24 months). Any extension beyond August 31 complicates the matching to PhD employment positions and involves the payment of tuition fees for (part of) the third academic year (see Section 2.1.3).

TI organizes one graduation ceremony each year, usually in November.

3.4.1 Field courses

Course codes marked by "*" refer to intensive courses. This means a course given in a different format (for instance 3 continous days of two lectures a day). See the field course schedule for details.

1. Behavioral and Experimental Economics (BEE)

Code	Course name	Instructor(s)	ECTS	Block
TI155	Experimental Economics	Sonnemans/Van de Ven	3	V
TI159	Risk and Rationality	Wakker	3	III
TI105	Evolutionary Game Theory	Van Veelen	3	III
TI132*	Putting Behavioral Economics to Work	Gneezy	3	tba
TI130	Mechanism Design and Market Institutions	Onderstal	3	IV
TI119	Behavioral Finance	Peters/V.d. Assem/ Zwinkels	3	V
TI128	Economics of Networks	Van der Leij/Lindner	3	II
TI101	Applied Microeconometrics I: Basic Techniques	Lindeboom/Bloemen	3	I
TI102	Applied Microeconometrics II: Empirical Treatment Evaluation	Van der Klaauw	3	II

2. Cooperative Behavior, Strategic Interaction, and Complex Systems (CSC)

Code	Course name	Instructor(s)	ECTS	Block
TI126	Behavioral Macroeconomics	Hommes	3	I
TI127	Complexity and Behavior	Hommes/Houba	3	V
TI128	Economics of Networks	Van der Leij/Lindner	3	II
TI151	Advanced Game Theory: Applications of Bargaining and Network Theory	Houba/Van der Brink	3	III
TI119	Behavioral Finance	V.d. Assem/Peters/ Zwinkels	3	V
TI155	Experimental Economics	Sonnemans/Van de Ven	3	V
TI105	Evolutionary Game Theory	Van Veelen	3	III

3. Econometrics and Operations Research (ECTOR)

Code	Course name	Instructor(s)	ECTS	Block
TI022	Advanced Time Series Econometrics	Boswijk/D. van Dijk	3	III
TI147	Bayesian Econometrics	Paap	3	II
TI152	Advanced Microeconometrics	Kleibergen	3	I
TI176*	TI Econometrics Lectures 2018	tba	3	V
TI1704	Advanced Econometrics I	Bos	3	II
TI1705	Advanced Econometrics II	Kleibergen/Pick	3	III
TI1706	Advanced Econometrics III	Koopman/Boswijk	3	IV

TI101	Applied Microeconometrics I: Basic Techniques	Lindeboom/ Bloemen	3	I
TI102	Applied Microeconometrics II: Empirical Treatment Evaluation	Van der Klaauw	3	II
TI116	Applied Macroeconometrics	Giuliodori/Pick/ Pozzi	3	I

4. Finance (FIN)

Code	Course name	Instructor(s)	ECTS	Block
TI119	Behavioral Finance	V.d. Assem/Peters/ Zwinkels	3	V
TI078	Institutions and Financial Structure	Perotti	3	III
TI106	Dynamic Corporate Finance	Gryglewicz	3	II
TI156	Financial Crises	Van Wijnbergen	3	II
TI107	Banking	Perotti	3	I
TI174	Course on Central Banking	Perotti/Van Wijnbergen	3	II
TI161	Empirical Asset Pricing	Eiling/Andonov/Mao	3	IV
TI169	Market and Systemic Risk Management	De Vries	3	IV
TI022	Advanced Time Series Econometrics	Boswijk/D. van Dijk	3	III
TI165	Law and Economics	Dari-Mattiacci	3	I

5. Macroeconomics and International Economics (MIE)

Code	Course name	Instructor(s)	ECTS	Block
TI158*	Advanced Macroeconomics I	Bayer	3	III
TI034	International Economics	Klaassen/ Emami Namini	3	V
TI137	Advanced Macroeconomics II	Stoltenberg/Brugemann	3	IV
TI160	The Macroeconomics of Pensions and Ageing	Beetsma/Romp	3	IV
TI153	Applied Macroeconometrics	Giuliodori/Pick/Pozzi	3	I
TI080	Public Finance	Jacobs	3	I
TI156	Financial Crises	Van Wijnbergen	3	II
TI163*	History of Economic Thought	Backhouse	3	III/IV

6. *Labor, Health, Education and Development (LHED)*

Code	Course name	Instructor(s)	ECTS	Block
TI101	Applied Microeconometrics I: Basic Techniques	Lindeboom/ Bloemen	3	I
TI102	Applied Microeconometrics II: Empirical Treatment Evaluation	Van der Klaauw	3	II
TI032	Development Economics	Elbers/Pradhan	3	III
TI154	Economics of Education	Plug/Oosterbeek	3	V
TI157	Health Economics	O'Donnell/Lindeboom	3	III

TI029	Labor Economics	Bloemen/Hochguertel	3	II
TI175*	TI Economics Lectures 2018	Duflo	3	V

7. Organizations and Markets (OM)

Code	Course name	Instructor(s)	ECTS	Block
TI138	Topics in Organization and Markets	Onderstal/Swank	3	V
TI038	Industrial Organization	Moraga	3	I
TI165	Law and Economics	Dari-Mattiacci	3	I
TI130	Mechanism Design and Market Institutions	Onderstal	3	IV
TI146	Topics in Political Economy	Crutzen	3	II
TI155	Experimental Economics	Sonnemans/Van de Ven	3	V
TI132*	Putting Behavioral Economics to Work	Gneezy	3	tba
TI128	Economics of Networks	Van der Leij/Lindner	3	II
TI151	Advanced Game Theory: Applications of Bargaining and Network Theory	Houba/ van der Brink	3	III
TI101	Applied Microeconometrics I: Basic Techniques	Lindeboom/ Bloemen	3	I
TI102	Applied Microeconometrics II: Empirical Treatment Evaluation	Van der Klaauw	3	II

8. *Spatial, Transport, and Environmental Economics (STEE)*

Code	Course name	Instructor(s)	ECTS	Block
TI134	Spatial Economics	de Groot/Van der Ploeg/Verhoef	3	V
TI133	Regional and Environmental Economics	de Groot/Poelhekke	3	II
TI139	Urban and Transport Economics	Van Ommeren/ Rouwendal	3	III
TI101	Applied Microeconometrics I: Basic Techniques	Lindeboom/ Bloemen	3	I
TI102	Applied Microeconometrics II: Empirical Treatment Evaluation	Van der Klaauw	3	II
TI038	Industrial Organization	Moraga	3	I
TI080	Public Finance	Jacobs	3	I

Students in the second year of the program may also choose core courses as field courses that they did not take in their first year. The course load for each course will be 3 ECTS. This offers students ample flexibility to engage in a PhD in the intersection between fields.

3.4.2 Field papers

Regular TI field courses are assessed by an exam and/or take home assignments, but not full papers. Instead, second-year MPhil students have the option to write a short field paper for 3 ECTS field course credits. A field paper is an original theoretical or empirical contribution (size 15-

20 pages). The paper is connected to a field course that the student has passed, but stands on its own and is an extension of material taught in the course. The teacher of the field course grades the field paper. The field paper does not count towards the major field requirements.

Students should register for a field paper at the start of the year, but do not have to commit to a topic or course for the paper. Instead, students should contact the teacher during the course to agree on a paper topic and deadline. Students should report the course and teacher for which they write their field paper to TI (courses@tinbergen.nl) as soon as possible, and never later than block IV, so that the institute can arrange the registration of the field paper's grade.

Papers can only be written for field courses. For practical reasons, field papers cannot be written for courses taught by external teachers.

3.4.3 Seminars

Apart from the MPhil seminar series organized for first year students, the institute's fellows and students organize a wide variety of seminar series. Student participation in seminars is highly recommended, but not rewarded with course credits. Seminar schedules can be found at www.tinbergen.nl.

3.4.4 Other courses and workshops

Courses organized by other graduate schools or by inter-university networks may qualify for field credits in the MPhil program. Students who want to follow courses (for credits) that are not listed in Section 3.4.1 should contact the Director of Graduate Studies in advance. Furthermore, they need approval from the Examination Board.

Some courses and workshops involve fees, substantial travel, and other costs. Note that costs are reimbursed according to the regulations and procedures outlined in the separate brochure "Facilities - Funding – Refunding. Information for MPhil and PhD students" that is available from the institute's intranet.

3.4.5 Matching to an MPhil thesis and possible PhD thesis supervisor

Together, the three faculties have a number of three-year PhD employment positions available to offer to students who successfully complete the MPhil program. However, this does not guarantee that all students find a match with a supervisor. Also, for distributional reasons it may be harder to transfer with one supervisor in one departmental research group than with another supervisor in another group.

Students are advised to check with their prospective MPhil thesis supervisor under what conditions they can transfer to a paid PhD position with that same supervisor. Students are also encouraged to investigate externally funded PhD opportunities available at the schools. To facilitate this, potential supervisors present to TI students their externally funded PhD projects.

Ideally, second-year students match up with an MPhil thesis supervisor before the end of December. Students should inform TI as soon as they have found an MPhil thesis supervisor by sending an email to mphilthesis@tinbergen.nl. Students who have not found a supervisor by December 1 will be contacted by the Director of Graduate Studies. Of course, students should contact the Director of Graduate Studies before December 1 if they need help in finding a supervisor.

3.4.6 MPhil thesis

The MPhil thesis is the final examination of the MPhil program and shows that the student is able to carry out research independently and to make a contribution to the scientific debate. TI aims at a thesis of exceptional quality and of such a level that, after further polishing, it can be published in an international scientific journal and/or be one of the papers to be included in the PhD thesis. The thesis is written under supervision of one of the institute's research fellows. For assessment of the MPhil theses we refer to the rubric on TI's intranet.

The MPhil thesis procedure is the following:

I. **Supervisor and commitment (December)**

1. Second-year students should have found a thesis supervisor before the end of December 2017.
2. Students and supervisors are requested to fill out the PhD proposal form and email the form to mphilthesis@tinbergen.nl. The PhD transfer form and the student's grade list will be submitted to the supervisor's department.

II. **Defense (July/August)**

3. Theses should be defended before the end of the academic year. If this is not feasible, enrollment with the host university for a 3rd year is required, including the payment of (part of) the tuition fee. This rule applies even when the defense date is scheduled in the beginning of September.
4. The thesis can only be defended if all other course work has been completed and graded.
5. As soon as the supervisor considers the thesis ready for defense the supervisor informs TI by sending an email to mphilthesis@tinbergen.nl. The Director of Graduate Studies will establish the assessment committee. The committee consists of the supervisor(s) and at least two other committee members who were not involved in the supervision. As a rule, at least one committee member is from a different university than the thesis supervisor. He/she is the external member of the MPhil thesis committee.
6. The thesis is defended before the thesis committee in a public meeting, announced on the TI website. The student sets a date for the defense in consultation with the committee members and books a room at TIA or TIR and informs TI about date/time/location of the defense. One week before the defense the thesis must be sent to mphilthesis@tinbergen.nl and to the committee members. A word version of the abstract must be included.
7. Before the defense, the external committee member summarizes in an email his/her opinion of the quality and level of the MPhil thesis, including a suggestion for a grade. This email has to be sent to the other committee members and to mphilthesis@tinbergen.nl before the defense date.
8. Grading of the thesis is done by the committee members who are not the supervisor(s) of the thesis.
9. The defense is a public seminar and takes one hour:
   0-45" Presentation by the student (possibly interrupted by discussion);
   45-55" Comments and questions (by the committee in particular);
   55" All except the committee members leave the room;
   55-60" The grade is determined by the committee members who are not the supervisor(s) of the thesis. The grade is based on: the thesis, the process as reported by the supervisor and the presentation and defense of the thesis. All committee members including the supervisor sign the assessment report. Written feedback for the student is drawn up by the supervisor;
   60" The student is called back in and the grade is awarded.

III After the thesis defense

10. Forms to be handed in by a committee member to the TI secretariat:
    - The assessment form, completed and signed by all committee members;

- The feedback form, completed and signed by the supervisor;
- First page of the plagiarism check report, signed by the supervisor.

Copies of the completed assessment form and feedback form are given to the student by the TI secretariat

3.4.7 Grading, credits, and retakes in the fields

All field courses and the MPhil thesis are graded on a 1-10 scale (see also Section 3.3.3), rounded off to one decimal as .0 or .5, with the following exceptions: any grade between 5.0 and 5.5 is round off to a 5; a 5.5 is round off to 6; a 0.5 does not exist.

Performance in field courses is assessed by a final (oral, take-home, or written sit-in) exam. Oral and written sit-in exams take place in the exam week; a take-home exam should have a deadline no later than three weeks after the course's final lecture. Home work assignments and class participation may contribute to the grade. See the individual courses' descriptions in Section 4.3 for details.

Exams are typically graded within 15 working days, and before July 15. Students can review their graded exam papers at the local TI secretariat up to four weeks after receiving their grade.

Credits are obtained for a field course block or the MPhil thesis only if it is completed with a final grade of 6 or up. Failing grades cannot be compensated.

There are no scheduled retakes for exams for field courses with a TI code. Students cannot resit any examination that they have already passed.

3.5 The Academic and Examination Regulations and the MPhil's boards

The MPhil's Academic and Examination Regulations provide details on the program's admission and examination procedures and can be downloaded from the institute's intranet.[4]

Here, we will provide some additional information on the Admission Board (Section 3.5.1), the Examination Board (Section 3.5.2), and the Educational Board (Section 3.5.3).

3.5.1 Admission Board

The Admission Board consists of representatives of the three faculties. The Admission Board decides on admissions to the program and on funding.

Current students will only have to deal with the Admission Board when it decides on second-year funding. At the end of the first year, the DGS will discuss second-year funding with all first-year students and propose funding arrangements to the Admission Board. Students should not contact the Admission Board directly.

3.5.2 Examination Board

The Examination Board consists of representatives of the three faculties. The Examination Board is responsible for the quality of examinations and diplomas. Furthermore, the Examination Board decides upon student requests regarding exemptions, deviations from the program and appeals

[4] This brochure explains some of these regulations and also serves as an appendix to these regulations (that is, it is the "Study Guide" referred to in the regulations). In case of conflicts between this brochure and the Academic and Examination Regulations, the text of the Academic and Examination Regulations is binding.

and decides upon measures in cases of fraud and plagiarism.

There are two reasons why a student may contact the Examination Board:

1. The Examination Board decides on deviations from the curriculum that may have a bearing on the diploma. Therefore, any request for replacement of parts of the curriculum through education provided by third parties, exemptions, postponement of deadlines, etcetera, should be sent to the Examination Board.
2. Students should try to settle disputes about examinations with the teacher first, and contact the DGS if the dispute remains. Students may submit disputes that cannot be solved this way to the Examination Board for arbitration.

In both cases, an email to examinationboard@tinbergen.nl suffices.

Reversely, the Examination Board will provide the student with formal study advice (see Section 3.3) and may take measures against a student in the case of fraud or misbehavior. Appeals against such decisions should be sent in writing to: Examination Board, Tinbergen Institute, Burg. Oudlaan 50, 3062 PA Rotterdam.To speed up this process, students should also send their appeal by email to examinationboard@tinbergen.nl.

3.5.3 Educational Board

The Educational Board consists of three MPhil students and three TI fellows. The Educational Board issues advice, both solicited and unsolicited, to the Director of Graduate Studies on all matters concerning the educational program, with the objective to maintain or improve the quality of the program. It meets twice a year or more often if considered necessary by a majority of the members.

The Educational Board has decided to organize its two regular meetings around the half-yearly MPhil evaluation meetings organized by the Students' Council. This provides students with a channel to voice their concerns about the MPhil program. Students may also contact the Educational Board directly with general concerns about the educational program. Students should not contact the Educational Board to solve individual disputes that are in the domain of the Examination Board.

3.6 Academic preparations

Depending on their educational background, students may want to prepare academically for one or more core sequences before they come to TI.

3.6.1 Microeconomics

Students lacking a strong background in economics will benefit from studying some undergraduate text book in intermediate microeconomics before they come to TI, such as

- Perloff, J.M. (2008), *Microeconomics* (Fifth Edition), Addison Wesley
- Frank, R. (2009), *Microeconomics and Behavior* (Eighth Edition), McGraw-Hill
- Pindyck, R. and D. Rubinfeld (2008), *Microeconomics* (Seventh Edition), Prentice Hall
- Varian, H.R. (2009), *Intermediate Microeconomics* (Eighth Edition), Norton
- Baye, M. (2006), *Managerial Economics & Business Strategy* (Fifth Edition), McGraw-Hill

3.6.2 Macroeconomics

Students without a strong background in economics are advised to study some undergraduate

macroeconomics texts before the start of Macroeconomics I in November, such as

- Mankiw, N.G. (2010), *Macroeconomics* (Seventh Edition), Worth
- Blanchard, O. (2008), *Macroeconomics* (Fifth Edition), Prentice Hall
- Burda, M. and Wyplosz, C. (2009), *Macroeconomics: A European Text* (Fifth Edition), Oxford University Press

and ideally also

- Weil, David N. (2008), *Economic Growth* (Second Edition), Addison Wesley.

3.6.3 Asset Pricing and Corporate Finance

Students without a strong background in finance that want to specialise in finance are advised to study the following undergraduate finance texts in Corporate Finance, Financial Economics, and Financial markets:

- Berk, J., and P. DeMarzo (2007), *Corporate Finance*, Pearson International.
- Bodie, Z., A. Kane, and A. Marcus (2008) *Investments,* Wiley.

and ideally also

- Leroy, S.F., J. Werner, and S.A. Ross (2000), Principles of Financial Economics, Cambridge University Press.

3.6.4 Mathematics

Mathematics is an ambitious math refreshment course. This course should be useful to most students, but those with a very strong math background may be exempted from Mathematics class attendance and home works (but not the exam).
All incoming students are supposed to be familiar with the basics of the usual maths courses for undergraduate students in economics:

a. Functions of one variable: linear functions, quadratic functions, polynomial functions, power functions, exponential functions, logarithmic functions, inverse functions.
b. Differentiation: relation with tangent, rules for differentiation (including product rule, quotient rule, chain rule), linear approximation, Taylor approximation.
c. Integration: indefinite and definite integrals, primitive of a function, relation with area.
d. Linear equations: matrix and vector notation, Gaussian elimination, matrix multiplication, transpose.

Students lacking a strong math background should prepare before they come to TI, using any textbook on mathematics for economists that treats these topics, such as

- Sydsaeter, K. and Hammond, P. (2008), *Essential Mathematics for Economic Analysis* (Third Edition), Prentice Hall
- Simon, C. P. and L. E. Blume (1994), *Mathematics for Economists*, W. W. Norton & Company

or the textbooks on Calculus and Linear Algebra used for Mathematics I (see Section 4.2). One source of many useful exercises is:

- Van de Craats, J. and R. Bosch (2009), *Basisboek Wiskunde* (2^{e} editie), Pearson (staff.science.uva.nl/~craats/)

This Dutch-language book is useful for all who need to prepare for Math, including those who cannot read Dutch. It is very compact and the left-hand pages of this book give many exercises, mostly in terms of mathematical symbols so that there is no need to understand the accompanying Dutch text. However, this book does not contain exercises on vectors and matrices. Schaum's Outline books on *Calculus and on Linear Algebra (Vectors and Matrices)*, published by McGraw-Hill, contain many useful exercises as well (www.mhprofessional.com/templates/index.php?cat=145).

3.6.5 Econometrics

Students in the standard track should read Chapter 1 of the book used in this track's first course (TI012),

- John A. Rice (1995). *Mathematical Statistics and Data Analysis,* 2nd Edition, Duxbury Press, ISBN: 0-534-20934-3 or 3rd Edition (2007), ISBN: 0-534-39942-8

before the start of Statistics and Econometrics in September.

The advanced track aims at students who already master econometrics at the level of the standard track.

3.6.6 Principles of Programming in Econometrics

Students are expected to have studied the initial exercise E0, available through the website http://personal.vu.nl/c.s.bos/ppectr17/, before the start of the course. They are welcomed to read through the slides on the syntax, ppectr_python_syntax.pdf in advance. Background material can be found at the websites of Kevin Sheppard, or Thomas Sargent & John Stachurski.

Details about the general programming techniques will follow in the course, but we will assume you are able to pick up the syntax during the course with relatively little help.

4. Course descriptions

4.1 Core courses

This section does not explicitly state the core courses' entrance requirements. However, all students in core courses should have the academic background expected from a successful MPhil applicant (see Section 2.1.2) and, if necessary, prepare as suggested in Section 3.6. Moreover, note that later core course blocks often build on earlier course blocks within, and occasionally across, each of the core sequences.

A core course block consists of of weekly lectures with regular homework assignments and a 1 hour tutorial. A teaching assistant (TA) gives the weekly tutorials and has a weekly office hour (time and place are announced in the first lecture).

4.1.1 Micro Sequence

TI1710 MICROECONOMICS I (Individual Decision Making and General Equilibrium)

Instructors: Dr V. Karamychev (EUR) and Prof. J. Tuinstra (UvA)

Short subject description:
The course "Microeconomics I" is the fundamental microeconomics course which studies individual decision-making and its relation to market clearing price formation. It builds on classical consumer choice theory. Then, individual behaviours are further integrated into a closed and interrelated system in which the equilibrium values of all variables are simultaneously determined. This is in contrast to the partial equilibrium approach, where all variables, which are not directly related to the problem at hand, are taken to be given. Thus, the course develops a theory that attempts to predict the complete vector of individual final consumptions and individual productions from the fundamentals of the economy.

Course content:
Preferences, Consumer choice, Classical demand theory, Aggregate demand, Production, Edgeworth Box, Walrasian General Equilibrium, Its Existence and Uniqueness, and Its Welfare properties, Price adjustment, Market imperfection and externalities, Incomplete markets and inefficiency.

Course objective:
After completing the course students will be able to:
1. Identify and explain economic concepts from the theory of individual decision making.
2. Compute individually rational behavior of an economic agent in any economic environment.
3. Identify potential links between different elements of individual behavior that follow from the theory.
4. Apply the theory of individual decision making to general equilibrium theory
5. Identify the necessary conditions for market efficiency and the factors that lead to inefficiencies.
6. Identify potential pitfalls for using applied general equilibrium models in complex economic environments.

Literature: A. Mas-Colell, M.D. Whinston, and J.R. Green (1995). Microeconomic Theory, New York: Oxford University Press

TI1711 MICROECONOMICS II (Game Theory)

Instructors: Prof. P.P. Wakker (EUR) and Prof. J.L. Moraga-Gonzalez (VU)

Short subject description:
Classical game theory to analyze, mostly mathematically, strategic interactions, cooperatively or not, between two or more rational parties, mostly leading to equilibria.

Course contents:
Since the 1970s, questions about material supply and demand have become less central in economics, and questions about human interactions and information have become more central. Game theory provides the basic tools for investigating the societal inefficiencies due to selfish strategic behavior of individuals, and ways to minimize those inefficiencies. In its first years, game theory was purely theoretical, so as to develop its basic concepts. It was later extended to experimental economics, and nowadays its tools are used in virtually every economic discipline.

Course objective:
After having completed the course students:

- can use general techniques to determine outcomes, usually equilibria, in many strategic situations,
- can see through conflicts, incredible threats, possibilities for cooperation, bargaining, voting, proper incentives, moral hazard, evolutionary stability, optimal choice of spouse, and adverse selection.
- learn the subtle counterfactual reasoning typical of strategic interactions between two or more rational beings.

Literature:
Compulsory:

- DOI 10.1007/978-3-662-46950-7; ISBN 978-3-662-46949-1; ISBN 978-3-662-46950-7 (eBook);
- Peters, Hans J.M. (2015) "*Game Theory; A Multi-Leveled Approach*" (2nd edn) Springer, Berlin. Most probably free (and legally!) downloadable from internet.

Recommended (optional):

- Gibbons, Robert (1992). *A Primer in Game Theory*, Prentice-Hall, London; (Nice casual reading)
- Luce, R. Duncan & Howard Raiffa (1957). *Games and Decisions,* Wiley, New York. (Deepest book on game theory)
- Tadelis, Steven (2013). *Game Theory: An Introduction*, Princeton University Press, Princeton, NJ. (Very didactical, but too elementary for this course. Good background if this course is difficult.)

TI1712 MICROECONOMICS III (Information and Contract Theory)

Instructors: Prof. R. Sloof (UvA) and Prof. B. Visser (EUR)

Short subject description:
Contract theory deals with the question of how economic agents (optimally) structure contractual relationships in the presence of asymmetric information.

Course contents:
Economics is about the creation of value through markets, organizations and other institutions. Asymmetric information and bounded rationality may get in the way of value creation. This course presents a number of insights from contract theory for dealing with these twin problems. It starts with moral hazard, and adverse selection in elementary settings, then turns to multidimensional incentive problems, contracts for teams, relational contracts, incomplete contracts, decision rights and authority, and asset ownership. It ends with a discussion of cheap talk and communication. These topics are approached by applying contract theory to problems in labour economics,

organizational economics, and corporate finance.

Course objective:
After this course students are:

- Familiar with basic models and techniques used within contract theory
- Able to solve for the optimal contract in some standard contractual settings studied in the literature using game-theoretic techniques.
- Aware of the implications and limitations of contract theory for making sound empirical predictions

Literature:
Compulsory:

- Bolton, P. and M. Dewatripont, 2005, *Contract Theory*, The MIT press: Cambridge
- Selected papers

Recommended (optional):

- Laffont, J.J. and D. Martimort, 2002. *The theory of Incentives. The Principal-Agent Model*, Princeton University Press: Princeton
- Salanie, B., 2005. *The Economics of Contracts: A Primer*, The MIT press: Cambridge
- Selected papers

TI1713 MICROECONOMICS IV (Behavioral Economics)

Instructors: Prof. P.P. Wakker (EUR) and Prof. T.J.S. Offerman (UvA)

Short subject description:
Behavioral economics (increasing empirical realism using psychology).

Course contents:
This course consists of two parts. One part deals with the behavioral revolution in economics, where differences between homo sapiens and homo economicus ask for a rewriting of individual risk behavior, individual intertemporal behavior, individual utility, and, thus, of virtually all economic models. The other part considers the path-breaking insights of behavioral economics for interactive decision making. Special attention will be dedicated to how behavioral economics changed the thinking on learning, equilibrium, social preferences, strategic communication and markets.

Course objective:
Students can carry out empirical measurements, quantitative predictions, and economic applications of psychological insights (changing homo economicus into homo sapiens) into the area of their own research interest.

Literature:
Offerman:

- Reader

Wakker:

- Kahneman, Daniel (2011). *Thinking: Fast and Slow*, Penguin Books, London
- Thaler, Richard H. & Cass R. Sunstein (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness,* Yale University Press, New Haven

4.1.2 Macro Sequence

TI1714 MACROECONOMICS I (Stochastic Neoclassical Growth Models)

Instructor: Dr B. Brügemann (VU)

Short subject description:

This course provides an introduction to stochastic neoclassical growth models. Macroeconomists builds on this class of models for many applications, including business cycles, growth, inequality, and asset pricing.

Course contents:
This course introduces you to stochastic neoclassical growth models, and in doing so it serves as the link between the general equilibrium theory you studied in Micro I and macroeconomics. Stochastic neoclassical growth models are basic models of the evolution of aggregate economic activity over time which build on general equilibrium theory. Standard consumer and producer theory is used to model the behavior of households and firms. Markets are perfectly competitive and complete in these models, and typically bring about an efficient allocation of resources. In this sense there are no frictions or market failures. This class of models has served as a starting point for macroeconomists to think about a large variety of issues, including business cycles, growth, inequality, and asset pricing.

These models are useful for three related reasons. First, they are useful in understanding the efficient allocation of resources in a particular situation, which is a useful benchmark. Second, the nature of discrepancies between the efficient allocation of resources implied by the model and observations of what is going on in the real world can help to determine what type of frictions ought to be included in the model in the context of a particular application. Third, as one introduces frictions into the model to study a particular application, typically various elements of the neoclassical growth model are retained, so they remain important building blocks in the modeling toolbox of macroeconomists.
For example, so-called Dynamic Stochastic General Equilibrium (DSGE) models are a class of models that is widely used to study monetary and fiscal policy, and they are constructed by introducing a variety of frictions into basic stochastic neoclassical growth models.

The course starts where Micro I left off. We continue the study of general equilibrium theory, with a focus on making it operational for analyzing macroeconomic issues. Specifically, we will consider aggregation, uncertainty, and dynamics. Having covered these basics, we will study different versions of the neoclassical growth model, specifically a version with infinitely-lived households and a version with overlapping generations of finitely-lived households. To study quantitative implications one needs to solve the models numerically. As a first step in this direction, you will practice solving the neoclassical growth model using dynamic programming.

Similar to Micro I, this is a first and foremost a theory course. We will use these models to take a first pass at some applications. The applications vary from year to year, and are drawn from business cycles, growth, inequality, and asset pricing. The purpose of the applications is primarily to promote the understanding of the theory, rather than provide state-of-the-art answers to applied questions.

Course Objective:
After the course students are:

- familiar with issues of aggregation, uncertainty, and dynamics in general equilibrium theory
- familiar with stochastic neoclassical growth models
- able to numerically solve basic neoclassical growth models using dynamic programming

Literature:

- Lecture notes, to be published on blackboard
- Optional: Acemoglu, D. (2008). *Introduction to Modern Economic Growth*, second edition, Princeton University Press

TI1715 MACROECONOMICS II (Macroeconomic Policy)

Instructor: Dr C.A. Stoltenberg (UvA)

Short course description:

In Macroeconomic Policy, we study the optimality of fiscal and monetary policies in a general equilibrium context.

Course contents:
The course builds on Macroeconomics I and applies dynamic stochastic general equilibrium models to the analysis of monetary and fiscal policy. It consists of four main parts. In the first part, a basic competitive equilibrium framework is developed which serves as the main building block for the course. The second part focuses on the role of fiscal policy. Here, effects of government spending, the role of public debt, and optimal taxation under commitment will be discussed. The third part introduces money into the framework and derives principles for optimal monetary policy under perfectly flexible prices. Further, the issues of monetary policy implementation and the determination of the price level will be addressed. The last part extends monetary policy analysis to the case where prices are imperfectly flexible. Within this framework optimal monetary policy under commitment and discretion will be examined, and interactions between monetary and fiscal policy will be discussed

Course objectives:
In this class, students learn to

- solve dynamic stochastic general equilibrium models
- show whether a long-run equilibrium exists and is unique
- derive conditions for a unique set of stable equilibriums sequences
- formally compute optimal tax and monetary policies in general equilibrium models
- understand the economic mechanism why a certain policy is optimal.

Literature:

- Ljungqvist, L. and T.J. Sargent (2012). *Recursive Macroeconomic Theory*, 3rd Edition, Cambridge Massachusetts: The MIT Press
- Walsh, C.E. (2010). *Monetary Theory and Policy*, Second Edition, Cambridge Massachusetts: The MIT Press

TI1716 MACROECONOMICS III (Frictions and Resource Allocation)

Instructors: Prof. E.J. Bartelsman (VU) and Prof. P. Gautier (VU)

Short subject description:
This course extends macro models to analyze the effects of frictions in hiring and investment on product market, capital market and labor market outcomes.

Course contents:
Key macro indicators— unemployment, GDP, and productivity growth— may not follow the optimal paths determined in a frictionless economy. Recent models are much more careful in dealing with frictions agents face in reality, such as entry and exit fees, delays in finding transaction partners, information asymmetries, and limited contract enforcement. In this course, we explore the implications of heterogeneous agents facing various frictions that frustrate the allocation of resources in labor, capital and product markets.
By studying these models, students not only learn key aspects of three important topics in macroeconomics, namely labor market developments, business cycle analysis, and long-run growth, but also key building blocks that are useful by themselves.
We briefly discuss empirical regularities observed in the data regarding labor markets, firm demographics and productivity growth. After highlighting the difficulties of standard models to explain these regularities, we explore recent modifications. We start the labor market and discuss different ways to model how agents search, match, and bargain over prices. More specific examples are wage posting, Nash bargaining, and directed search. Next we turn to growth models of heterogeneous firms and study the implications of frictions for static and dynamic efficiency. Special attention will be paid to frictions in capital investment.

Course objective:

- Understand and use the tools (game theory, dynamic programming) that are used in this literature.
- Learn how to formulate models that are rich in terms of the factors necessary to understand the key mechanisms for the questions at hand and abstract from irrelevant details.

Key Literature:

- Cooper, Russell W., and John C. Haltiwanger (2006). *On the Nature of Capital Adjustment Costs,* The Review of Economic Studies 73 (3) (July 1): 611–633, doi:10.1111/j.1467-937X.2006.00389.x
- Hopenhayn, Hugo A. (1992). *Entry, Exit, and Firm Dynamics in Long Run Equilibrium*, Econometrica 60 (5, pag. 1127-1150.): 1127–1150
- Mortensen, Dale T., and Christopher Pissarides (1994). *Job Creation and Job Destruction in the Theory of Unemployment*, Review of Economic Studies 61 (3(208)): 397–416
- Rogerson, Rob Shimer, and Randall Wright (2005), Search-Theoretic Models of the Labor Market: A Survey, *Journal of Economic Literature*, XLIII 959–988

TI1717 MACROECONOMICS IV (Financial Frictions in Macroeconomics)

Instructor: Prof. S.J.G. van Wijnbergen (UvA)

Short subject description:
This course focuses on why finance and financial structure matters for macroeconomics.

Course contents:
We draw on recent developments in microeconomic research on information asymmetries in financial markets and the consequences of market incompleteness to introduce financial frictions in macroeconomics. We pay special attention to the concepts of liquidity and financial fragility, to the consequences of limited risk sharing (market incompleteness), macroeconomic consequences of financial regulation and undercapitalized banks and to the macroeconomic causes and consequences of financial and Balance of Payment crises. Students will be introduced to many concepts from modern theories of financial intermediation and how they can shed light on the macroeconomic importance of financial structure.

Course objective:
The course intends to introduce students to currently ongoing research on financial frictions and macroeconomics; after this course students should be able to actively take part in this research agenda.

Literature: TBA

4.1.3 Econometrics Sequence

TI1701 ECONOMETRICS I

Instructor: Prof. D. Fok (EUR)

Short subject description:
This course provides knowledge on the quantitative analysis of economic data.

Course contents:
In this course we provide an understanding of basic econometric methods. Knowledge of these methods allows one to understand modern empirical economic literature and to perform one's own analysis of economic and business data. The technique of regression is discussed, as well as various extensions that are needed in concrete applications to deal with, for example, heteroskedasticity, autocorrelation, endogeneity, and non-linearities. Furthermore an introduction to discrete choice modeling is given. The main emphasis of the course is on the interpretation of

models and outcomes of estimation and testing procedures. The students practice this themselves by analyzing economic and business data by means of the econometric software package EViews and by interpreting and extending formulas for basic models and concepts.

Course objectives:
After this course students will be able to apply econometric techniques to answer empirical questions and will be able to critically evaluate econometric models.

Literature:
Compulsory:

- C. Heij, P.M.C. de Boer, P.H. Franses, T. Kloek, and H.K. van Dijk (2004). *Econometric Methods with Applications in Business and Economics*, Oxford University Press, Oxford (ISBN:0-19-926801-0)

Recommended:

- M. Verbeek (2004). *A Guide to Modern Econometrics* (3rd edition), Wiley
- J.M. Wooldridge (2000). *Introductory Econometrics, a Modern Approach* (4th edition), South Western College Publishing

TI1702 ECONOMETRICS II

Instructors: Prof. B. van der Klaauw (VU) and Prof. M. Lindeboom (VU)

Short subject description:
Tba

Course contents:
Tba

Course objective:
Tba

Literature:
Tba

TI1703 ECONOMETRICS III

Instructor: Dr K.A. Lasak (UvA)

Short subject description:
This course provides knowledge on the quantitative analysis of economic time series.

Course contents:
In this course we provide an understanding of basic econometric methods for the analysis of time series. Knowledge of these methods allows one to understand modern empirical economic literature and to perform one's own analysis of economic and business time series data. Autoregressive Moving-Average (ARMA) models are considered for stationary time series. Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models are discussed for describing the time-varying volatility of time series. Models (and tests) for deterministic and stochastic trends are addressed. It is discussed how forecasts are computed and assessed. Further, multivariate time series models are considered: the Vector Autoregression (VAR) and cointegration. The main emphasis of the course is on the interpretation of models and outcomes of estimation and testing procedures. The students practice this themselves by analyzing economic and business time series by means of the econometric software package EViews and by interpreting and extending formulae for basic models and concepts.

Course objectives:

After this course students will be able to apply time series models to answer empirical questions and will be able to critically evaluate such models.

Literature:

- James D. Hamilton (1994), *Time Series Analysis*, Princeton University Press
- Walter Enders (2015), *Applied Econometric Time Series*, Wiley, 4th Edition
- M. Hashem Pesaran (2015), *Time Series and Panel Data Econometrics*, Oxford University Press

TI1704 ADVANCED ECONOMETRICS I

Instructor: Dr C.S. Bos (VU)
Short subject description:
Advanced Econometrics I covers the background Econometric Theory and a set of Micro-econometric models.

Course contents:
The course is built up around the book of Cameron & Trivedi, with references to the material of Hansen. The first four lectures discuss ordinary least squares and related methods, maximum likelihood, hypothesis and specification testing. They are followed by a discussion of the main micro-econometric models, including models for binary and multinomial outcomes, tobit and selection models, and finally models for duration data.

Theoretical exercises are discussed throughout this course. Concepts are illustrated by means of simulations and empirical applications. In class, the Python programming environment is used, though students are free to choose their own.

Course objective:
By the end of this course, students will have gained a thorough understanding of the theory behind basic least squares estimation and inference, and the extension towards estimation through a likelihood function. They are able to apply this knowledge on micro-econometric models, and understand the consequences of modelling decisions. This will have set the scene for the more general models and estimators to be covered in Advanced Econometrics II and III.

Literature:
C. Cameron and P. Trivedi (2005). *Microeconometrics: Methods and Applications*, Cambridge University Press
B. E. Hansen (2017). *Econometrics*, http://www.ssc.wisc.edu/~bhansen/econometrics

TI1705 ADVANCED ECONOMETRICS II

Instructor: Prof. F. Kleibergen (UvA) and Dr A. Pick (EUR)

Short subject description:
Advanced Econometrics II develops the necessary theory for understanding core econometric techniques based on regression, GMM and likelihood methods.

Course contents:
The course considers chapters 8-12 of Davidson & MacKinnon's textbook dealing with Instrumental Variables, Generalized Method of Moments and Likelihood based techniques. Modeling approaches, estimation and testing methods are developed and asymptotic techniques and finite sample properties are discussed.

Course objective:
Obtaining a deep understanding of econometric theory and the practice of producing econometric inference especially with respect to the specification, estimation, and testing of models for linear

and nonlinear relationships by least-squares, instrumental variables and GMM or likelihood based techniques.

Literature:
Compulsory: R. Davidson and J.G. MacKinnon (2004). *Econometric Theory and Methods*, OUP
Recommended: Additional reading from books and papers

TI1706 ADVANCED ECONOMETRICS III

Instructors: Prof. H.P. Boswijk (UvA) and Prof. S.J. Koopman (VU)

Short subject description:
This course discusses advanced models and methods for the econometric analysis of economic and financial time series.

Course contents:
Several major advances in time-series econometrics and likelihood-based inference have occurred in the past years. These advances have provided a major breakthrough in the modeling of time series using advanced up-to-date econometric methodologies. The first part of the course aims to provide a thorough understanding of linear time series models, including frequency domain analysis, multivariate models and cointegration. The second part focusses on state space models and the Kalman filter, discussing signal extraction, maximum likelihood estimation and dynamic factor models. The course will also discuss ARCH and score-driven volatility models. Various empirical illustrations in economics and finance will be discussed.

Course objective:
Students will receive a good training in time-series econometrics, the modeling of economic and financial time series using advanced techniques.

Literature:
Compulsory:

- Durbin, J. and Koopman, S.J. (2012). *Time Series Analysis by State Space Methods*, Second Edition, Oxford University Press
- Van der Vaart, A.W. (2013), *Time Series*. Lecture notes, Universiteit Leiden. http://www.math.leidenuniv.nl/~avdvaart/timeseries/dictaat.pdf.

Recommended:

- Brockwell, P.J. and Davies, R.A. (1987). *Time Series: Theory and Methods*, New York: Springer-Verlag
- Harvey, A.C. (1989). *Forecasting, Structural Time Series Models and the Kalman filter*, Cambridge University Press.
- Shumway, R.H. and Stoffer, D.S. (2000). *Time Series Analysis and Its Applications*, New York: Springer-Verlag.

TI1709 MATHEMATICS

Instructors: Dr ir F.O.O. Wagener (UvA) and Dr J. Brinkhuis (EUR)

Short subject description:
Mathematics is an ambitious math refreshment course.

Topics include:

1. Matrices, inverses, determinants
2. Eigenvalues, eigenvectors, and the spectral theorem
3. Multidimensional calculus
4. Integration

5. The implicit function theorem and static optimisation
6. Convexity
7. Dynamic optimisation

Literature:
To be announced

TI1707 STATISTICS

Instructor: Dr P.J.C. Spreij (UvA)

Short subject description:
The course starts off with the very first principles of probability and quickly passes on to essential statistical techniques. Estimation and testing theory will be reviewed, including maximum likelihood estimators, likelihood ratio test and (least squares) regression.

Course contents:
In the course we treat the following topics.
Sample spaces, probability measures, distribution functions, random variables with discrete and continuous distributions, functions of random variables, multivariate distributions, random vectors, independent random variables, conditional distributions, functions of random vectors and their distributions, expectation and variance, covariance and correlation, the law of large numbers, central limit theorem, chi-square and t-distributions, estimation, method of moments, maximum likelihood, large sample theory, confidence intervals, Cramer-Rao bound, hypothesis testing, Neyman-Pearson paradigm, likelihood ratio tests, confidence intervals, linear regression, least squares estimation of regression parameters, testing regression hypotheses.

Course objective:
After the course students will be able to apply fundamental techniques needed for statistical inference. They will also be in the position to continue study and research on a more advanced level.

Information will also become available on staff.science.uva.nl/~spreij/onderwijs/TI/statistics.html

Literature: John A. Rice (1995). *Mathematical Statistics and Data Analysis,* 2nd Edition, Duxbury Press, ISBN: 0-534-20934-3 or 3rd Edition (2007), ISBN: 0-534-39942-8

TI1708 ASYMPTOTIC THEORY

Instructor: Dr P.J.C. Spreij (UvA)

Short subject description:
Tba

Course contents:
Tba

Course objective:
Tba

Literature: Tba

TI143 PRINCIPLES OF PROGRAMMING IN ECONOMETRICS

Instructor: Dr C.S. Bos (VU)

Short subject description:
This course provides a primer to students on how to tackle in general a programming problem in Econometrics.

Course contents:
During four consecutive days, the basics of programming in Econometrics are explained. This course starts with a single day where we discuss the basic syntax of the programming language Python, with excursions to other languages like Matlab and/or Julia. Using Python as a workhorse, during the next three days general concepts of programming are discussed, including how to proceed from a set of equations via an algorithm to a valid program, robustness of programming, and other more practical topics related to Econometrics. Each of the topics is explained using Python code, exploring syntax and pitfalls as we go.

The course is split between a theoretical and a practical part. The theoretical part assumes a matrix-oriented programming language. It is not immediately related to a specific programming environment, though examples will be given in Python, with some Matlab and Julia for comparison. The practical part of the course uses Python (for students of the TI MPhil) or Matlab (for students of the master in QRM) to implement several exercises, under the guidance of assistants.

Students are expected to have studied the initial exercise E0, available through the website mentioned below, before the start of the course. They are welcomed to read through the slides on the syntax, ppectr_python_syntax.pdf in advance. Background material can be found at the websites of Kevin Sheppard, or Thomas Sargent & John Stachurski.

Course objective:
After the course students are able to analyze the programming problem they have at hand, to split the task into smaller subtasks and define clearly the dependencies between the tasks. They have learned how to structure their program, and how to choose wisely the data structure that is helpful in solving the problem. They are able to set up the necessary code in Python or Matlab.

Literature:
- Slides (available through http://personal.vu.nl/c.s.bos/ppectr17/)
- Python for Econometrics, Kevin Sheppard, https://www.kevinsheppard.com/Python_for_Econometrics
- Quantitative Economics, Thomas Sargent & John Stachurski, https://lectures.quantecon.org/py/ (Python) or https://lectures.quantecon.org/jl/ (Julia)

Assessment:
This course is offered as a service to the students of the TI and VU QRM/Econometrics. Attendance during the course is registered. At the end of the course, there is a voluntary exercise, which may be handed in for comments on the programming style, but there is no formal assessment.

4.1.4 Finance Sequence

TI1718 ASSET PRICING

Instructors: Prof. R.J.A. Laeven (UvA) and Prof. M.H. Vellekoop (UvA)

Short subject description:
Asset Pricing is concerned with the value of uncertain future payoffs.

Course contents:
This course provides an introductory yet comprehensive and rigorous treatment of modern asset pricing theory.
It covers the following topics:
1. Expected utility, risk aversion and single period portfolio choice;

2. Mean-variance analysis and CAPM;
3. Multifactor pricing models;
4. Stochastic discount factors and the Fundamental Theorem of Asset Pricing;
5. Dynamic programming and pricing in incomplete markets;
6. Derivatives;
7. Stochastic calculus.

Course objective:
Students who successfully complete this course will have an in-depth overview of modern asset pricing theory.

Literature:
- Selected chapters from:
  Pennacchi, G. (2008). *Theory of Asset Pricing,* Addison-Wesley.
  Cochrane, J. (2005). *Asset Pricing* (revised edition), Princeton University Press (*Background reading material)*.
- Selected articles.
- Lecture notes and other material, to be made available via Blackboard.

TI1719 CORPORATE FINANCE THEORY

Instructor: Dr V. Vladimirov (UvA)

Short subject description:
Corporate finance is the area of finance dealing with monetary decisions made by business enterprises and the tools and analysis used to make these decisions.

Course contents:
This course covers core and new topics in corporate finance theory with an emphasis on introducing the microeconomic tools needed to address open research questions. Students are expected to be familiar with basic notions in finance and game theory. Some basic knowledge of contract theory is an advantage, but the course will be largely self-contained in this respect. The main focus of the lectures will be on financial contracting in the presence of agency problems, asymmetric information, and incomplete contracting. Further topics may include real options and dynamic financial contracting. For each topic there will be some recommended and/or required literature to accompany the lectures. The textbook closest to the material covered in class is Tirole "The Theory of Corporate Finance", Princeton University Press, 2006. However, readings will be based mostly on articles. A detailed list of reading assignments will be available at the start of the course.

Course objective:
Students will become aware of the basic principles and issues in corporate finance as well as of the tools needed to address these issues. This should give them first basis to do own research in the field, both theoretical as well as empirical.

Literature:
Core readings are marked with an (*).

Basic tools of financial contracting and security design:
- Tirole (2006). *The Theory of Corporate Finance*, Princeton University Press, Chapters 1, 2, 3, 4, 6, 7. (*)
- Bernanke and Gertler (1989). *Agency costs, net worth, and business fluctuations*, American Economic Review 79, 14-31.
- Biais, Bruno, and Catherine Casamatta (1999). *Optimal leverage and aggregate investment*, Journal of Finance 54, 1291-1323.
- DeMarzo, Peter M., and Darrell Duffie (1999). *A liquidity-based model of security design*, Econometrica 67, 65-99.

- Holmstrom, Bengt, and Jean Tirole (1997). *Financial Intermediation, Loanable Funds, and the Real Sector*, Quarterly Journal of Economics 112, 663-691.
- Innes (1990). *Limited liability and incentive contracting with ex-ante action choices*, Journal of Economic Theory 52, 45-67.
- Fudenberg and Tirole (1992). *Game Theory*, MIT Press, Chapter 11.2
- Leland and Pyle (1977). *Informational asymmetries, financial structure, and financial intermediation*, Journal of Finance 18, 371-387.
- Myers and Majluf (1984). *Corporate financing and investment decisions*, Journal of Financial Economics," 13, 187-221.
- Nachman and Noe (1994). *Optimal design of securities under asymmetric information*, Review of Financial Studies 7, 1-44.
- Townsend, Robert M. (1979). *Optimal contracts and competitive markets with costly state verification*, Journal of Economic Theory 21, 265-293.

Incomplete Contracting:

- Bolton and Dewatripont (2005). *Contract Theory*, The MIT Press, Chapters 11.3 and 12.4 (*)
- Tirole (2006). *The Theory of Corporate Finance*, Princeton University Press, Chapter 10. (*)
- Aghion and Bolton (1992). *An incomplete contracts approach to financial contracting*, Review of Economic Studies, 473-494
- Dewatripont and Tirole (1994). *A theory of debt and equity: diversity of securities and manager-shareholder congruence*, Quarterly Journal of Economics, 1027-1054
- Bolton and Scharfstein (1996). *Optimal debt structure and the number of creditors*, Journal of Political Economy 104, 1-25 (*)
- Gertner, Scharfstein and Stein (1994). *Internal vs. external capital markets*, Quarterly Journal of Economics 109, 1211-1230
- Inderst and Müller (2003). *Internal vs. External Financing: An Optimal Contracting Approach*, Journal of Finance 58, 1033-1062
- Inderst and Faure-Grimaud (2005). *Conglomerate entrenchment and external finance*, American Economic Review 95, 850-861 (*)
- Schmidt, Klaus (2003). *Convertible securities in venture capital*, Journal of Finance 58, 1139-1166 (*)

4.2 Field courses

Note that, in addition to the specific entrance requirements for each field course, all courses require that MPhil students have completed at least 48 ECTS of the first year's credits at the end of the first year (see Section 3.3) and have completed the MPhil seminar series.

Field courses consist of 2.5 hours of weekly lectures in small groups, where students and teachers closely interact.

TI151 ADVANCED GAME THEORY: APPLICATIONS OF BARGAINING AND NETWORK THEORY

Instructors: Dr J.R. van den Brink (VU) and Dr H.E.D. Houba (VU)

Short subject description:
This course studies some frontier topics in game theory with a focus on its applications to economic theory.

Course contents:
Based on classic and recent articles, we discuss the development of game theoretic tools to analyze economic issues related to bargaining and network analysis. In that part on bargaining, strategic bargaining models of bilateral negotiations and endogenous threats (e.g. strikes or trade wars) are discussed. Several strategic bargaining models support well-known solutions in cooperative or axiomatic bargaining theory. The extension to multilateral negotiations of coalition formation with externalities is made to study endogenous coalition formation and the division of the gains from cooperation. Time permitting, experimental studies of bargaining models are discussed. Cooperative solution concepts are also applied to explain endogenous coalition formation. In the part on network theory, game theoretic tools to analyze economic and social networks are introduced. We discuss allocation rules for various types of networks. Main attention will be given to communication networks and hierarchies. Finally, we apply these allocation rules to economic allocation problems with an implicit or explicit network structure such as water allocation, sequencing, assignment and auction games.

Course objective:
This course intents the students to teach the students recent developments in game theory, and how to apply these to analyze economic problems. In particular, we focus on bargaining and network models.

Literature: Selected papers (will be announced during the course).

Course entrance requirements:
Required: Microeconomics I + II
Recommended (optional): Microeconomics I, Mathematics I + II

Assessment: Homework assignments (100%).

TI172 ADVANCED MACROECONOMICS I

Instructor: Prof. C. Bayer (Bonn University)

Short subject description:
This course focuses on numerical solution techniques to solve dynamic planning problems, in particular dynamic stochastic general equilibrium models with heterogeneous agents.

Course content:
We start off with a revision of the theory of dynamic planning problem and some basic numerical tools such as function approximation and numerical integration. We will then study several

approaches to solve dynamic planning problems based on these basic tools. In particular, value and policy function iteration, perturbation methods, parameterized expectations, and methods of endogenous grids. Finally, we develop algorithms to solve models with heterogeneous agents. The techniques taught are useful in many branches of our profession not just in macroeconomics. MATLAB programming exercises are an essential part of this course.

Course objective:
After the course students are able to solve and analyze dynamic stochastic general equilibrium models.

Literature:
Compulsory: Selected papers
Recommended: Selected papers

Course entrance requirements:
Required: Macroeconomics I
Recommended: Some knowledge of MATLAB

Assessment: Take-home assignments.

TI173 ADVANCED MACROECONOMICS II

Instructors: Dr C.A. Stoltenberg (UvA) and Dr B. Brügemann (VU)

Short subject description:
The course discusses hot topics picked from the research frontier in macroeconomics. The course aims at Tinbergen students in the second year as well as PhD students in later years who would like to learn more about cutting-the edge research in macroeconomics. It builds on the macro sequence from the first year and introduces additional tools and techniques when needed.

Course contents:
The content of the course is adjusted annually to pick up new topics from the macroeconomic research frontier. Each class meeting (after the first) has two parts. In the first hour, students discuss a frontier paper with the aim of identifying the main contribution of the paper, determining if this paper is convincing, and coming up with an idea for further research on the topic. In the remainder of the class, one of the instructors gives a lecture introducing the topic of the frontier paper of the following week.
To ensure high quality discussions for the frontier papers, it is important that you have thought about the paper before the class meeting. To make the preparation more fun and to give you opportunities to learn from each other, we will do this using a team-based learning approach. In the first week of the course we will form teams of 3-4 students that will remain fixed for the duration of the course. Each team prepares a brief presentation about the paper, and submits it before the class meeting. At the beginning of each class meeting, one randomly selected team will use its presentation to lead the discussion using its presentation.
The topics for 2016 are currently under development. In 2015 we covered the following topics:

- Week 1: Data, puzzles and complete markets
- Week 2: The standard incomplete markets (SIM) model
- Week 3: Limited commitment
- Week 4: Optimal Unemployment Insurance over the Business Cycle
- Week 5: Aggregate Demand and Unemployment
- Week 6: Labor Supply and Business Cycles

Course objective:
The objective of this course is to expose you to hot topics picked from the research frontier in macroeconomics, and to practice your ability to identify promising research questions. The substantive content of the course combines recent papers from the research frontier with advanced material that bridges the gap between the first-year macro sequence and the research

frontier.

Literature: Selected papers

Course entrance requirements: Macroeconomics I to IV

Assessment: Your grade is based on a final exam (70%) and the presentations submitted by your team (30%).

TI152 ADVANCED MICRO ECONOMETRICS

Instructor: Prof. F. Kleibergen (UvA)

Short subject description:
This course is an advanced graduate micro-econometrics course. The emphasis is on weakening the assumptions of commonly using econometric estimation methods like maximum likelihood and the generalized method of moments (GMM).

Course contents:
For maximum likelihood methods that are employed to analyze limited dependent variables, we discuss semi-parametric methods which allow one to replace sometimes restrictive distributional assumptions on the errors. For GMM, which is already a semi-parametric estimation method, we discuss how to replace the Jacobian identification method. The resulting GMM procedures are so-called weak instrument robust and we discuss several papers in this area. We also discuss linear and non-linear panel data methods which are commonly applied. Here we focus on the idenfication of the parameters with a special emphasis on linear dynamic panel data models.
Topics: semi-parametric estimation, (linear dynamic) panel data models, weak instruments in linear instrumental variables regression models and GMM, empirical likelihood methods. The list of papers covered is stated below.

Course objective:
Course objective:
This course gets students acquainted with econometric methods that remain valid under less stringent assumptions than maximum likelihood, the more common econometric method. These methods allow one to analyze a wide range of applications under general conditions..

Literature:

- Newey, W.K. and D. McFadden. *Large Sample Estimation and hypothesis testing*, Handbook of Econometrics, Chap. 36., Vol. 4, Eds: R.F. Engle and D. MacFadden
- Powell, J.L. *Estimation of Semiparametric Models*, Handbook of Econometrics, Chap. 41, Vol. 4, Eds: R.F. Engle and D. MacFadden
- Arellano, M. and B. Honore. *Panel date models: Some recent developments*, Handbook of Econometrics, Chap. 53, Vol. 5, Eds: J.J. Heckman and E. Leamer
- Nelson, C.R., and R. Startz (1990). *Some Further Results on the Exact Small Sample Properties of the Instrumental Variables Estimator*, Econometrica, 4, 967-976
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- Kleibergen, F. (2008). *Size correct subset statistics for the linear IV regression model*, Brown University
- Kleibergen, F. and S. Mavroeidis (2008). *Inference on subsets of parameters in GMM without assuming identification*, Brown University
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Course entrance requirements: Statistics and Econometrics

Assessment: take-home exam

TI022 ADVANCED TIME SERIES ECONOMETRICS

Instructors: Prof. H.P. Boswijk (UvA) and Prof. D.J. van Dijk (EUR)

Short subject description:
This course focuses on modern techniques in time series econometrics, with applications in macroeconomics, finance and marketing.

Course contents:
The following topics will be covered: GARCH modelling, realized volatility, nonlinear regime-switching models, large-scale factor models, and forecast combination and evaluation. For each topic, theoretical aspects of the time series models and techniques are discussed. The application of these models in different areas is illustrated by means of recent journal articles and working papers, and a number of practical homework assignments.

Course objective:
After the course, students will be able to understand the main time series models and techniques, to critically assess articles and working papers that use such techniques, and to apply and extend them in their own research.

Literature:
- Franses, P.H. and D. van Dijk (2000). *Nonlinear Time Series Models in Empirical Finance*. Cambridge: Cambridge University Press
- Hamilton, J.D. (1994). *Time Series Analysis*. Princeton: Princeton University Press (Chapter 22)
- Selected articles and working papers

Course entrance requirements:
Required: Statistics and Econometrics I + II
Recommended: Advanced Econometrics

Assessment: Sit-in written exam (75%) and homework assignments (25%).

TI153 APPLIED MACROECONOMETRICS

Instructors: Prof. M. Giuliodori (UvA), Dr A. Pick (EUR) and Dr L.C.G. Pozzi (EUR)

Short subject description:
This is a ‘hands on’ course in which students will familiarize with standard econometric methods typically used in applied macroeconomics and international economics, and have the chance to

apply them and gain experience in dealing with macro data.

Course contents:
The first part of the course will introduce vector auto regressive (VAR) models addressing issues such as VAR specification and estimation, impulse response functions and variance decompositions, identification and structural decomposition (recursive and non-recursive short-run restrictions, long-run restrictions, sign restrictions, *etc*). The second part of the course will cover cointegration and error-correction models and non-linear time series models. The third part of the course will focus on static and dynamic homogeneous macro panels with large T (Within Group estimation), endogeneity, cross-sectional dependence (SUR, CCE estimation), heterogeneity (Mean Group approach), and heterogeneous dynamic panels with cross-sectional dependence.

Course objective:
The key objective of the course is applying these techniques rather than deriving econometric and statistical properties of estimators. Each session will be structured as follows. First the specific econometric topics will be introduced and their key elements outlined. Then, a critical discussion of the key empirical papers applying those methods will be provided. Finally, we will conclude each session providing information on the datasets, econometric package/commands, and research questions that students will be asked to address in the take-home assignments.

Literature: Lecture notes and selected papers.

Entrance requirements: Statistics and Econometrics I + II

Assessment: Take-home assignments to be submitted individually each week or every two weeks. No final exam.

TI101 APPLIED MICROECONOMETRICS I: BASIC TECHNIQUES

Instructors: Prof. M. Lindeboom (VU) and Dr H.G. Bloemen (VU)

Short subject description:
This course focuses on drawing inference from cross-sectional, panel and longitudinal data using techniques that are frequently used in applied econometric research.

Course contents:
We consider limited dependent variable models, maximum likelihood estimation, quantile regression, panel data models and duration analysis. The limited dependent variable models discussed during the course are binary choice models, Tobit models, sample selection models, and switching regression models. Furthermore, we consider random and fixed effects linear models, dynamic panel data model, GMM estimation and fixed-effect logit estimation. The final lectures of the course are devoted to introducing duration models and discussing the specification, identification and estimation of these models. In particular, we consider both single-spell and multiple-spell duration models. With respect to the latter we discuss stratified partial likelihood estimation and other fixed-effect techniques. During the course applications of the different methods are discussed, mainly in the fields of labor economics, health economics, and the economics of education.

Course objective:
The key objective of the course is applying microeconometric techniques rather than deriving econometric and statistical properties of estimators. After the course student should be able to decide about the appropriate model, apply the estimation method correctly, and they should be able to interpret the estimation results.

Literature:
Compulsory: Cameron, A.C. and P. Trivedi (2005). *Microeconometrics: Methods and Application*s, Cambridge University Press
Recommended: Wooldridge, J.M. (2001). *Econometric Analysis of Cross section and panel data*,

MIT Press
During the lectures slides will be provided and papers will be discussed.

Course entrance requirements: Statistics and Econometrics I and II

Assessment: Sit-in written exam (75%) and three take-home assignment (25%). The take-home assignments will involve related empirical exercises.

TI102 APPLIED MICROECONOMETRICS II: EMPIRICAL TREATMENT EVALUATION

Instructor: Prof. B. van der Klaauw (VU)

Short subject description:
This course focuses on estimating causal effects using econometric techniques that are frequently applied in treatment evaluation literature.

Course contents:
Many empirical questions in economics depend on causal effects of programs or policies. Estimation of treatment effects using social experiments, natural experiments, and field experiments will be discussed. We introduce the potential outcome model and discuss the definition of different treatment effects such as average treatment effect, average treatment effect on the treated, quantile treatment effects and local average treatment effects. We consider instrumental variable estimation, regression discontinuity designs, difference-in-differences, methods to estimate dynamic treatment effects and partial identification methods. The emphasis of the course is on identification, estimation and interpretation rather than a thorough treatment of the asymptotic properties of the estimators. During the course applications of the different methods are discussed, mainly in the fields of labor economics, health economics, and the economics of education.

Course objective:
The key objective of the course is to learn student how to estimate causal effects from micro data. Student should understand the consequences of various identifying assumptions and should be able to decide about the appropriate evaluation approach.

Literature:
Compulsory: Cameron, A.C. and P. Trivedi (2005). *Microeconometrics: Methods and Application*s, Cambridge University Press
Recommended: Wooldridge, J.M. (2001). *Econometric Analysis of Cross Section and Panel data*, MIT Press
During the lectures slides will be provided and papers will be discussed.

Course entrance requirements:
Required: Statistics and Econometrics I and II

Assessment: Sit-in written exam (75%) and three take-home assignments (25%). The take-home assignments will involve related empirical exercises.

TI107 BANKING

Instructor: Prof. E.C. Perotti (UvA)

Short subject description:
The course reviews the literature on financial intermediation, focusing on recent work complementing the contractual approach with a view of system-wide risk creation and risk shifting. It is relevant for students interested in finance, macroeconomics and governance issues.

Course contents:

Topics include debt optimality, bank equity and risk incentives, maturity and liquidity transformation, liquidity externalities, bank runs, endogenous risk over the credit cycle, shadow banking, microeconomic foundations for macroprudential policy.

Course objective:
This course models credit and funding choice and risk incentives in individual banks, and derives implications for aggregate financial system behavior. The focus is on risk transformation role of banks and shadow banks, sources of endogenous credit cycles and instability, and the policy response. Half of the course drawing from recent work since the crisis, review the new foundations for regulatory policy and identify several areas where more conceptual and empirical work is needed.

Literature:
Required: Selected papers

Course entrance requirements:
Required: Microeconomics III (Contract Theory)
Recommended (optional): Corporate Finance Theory

Assessment: The course has a sit-in final examination plus some homework assignments. The final grade will be a weighted average of the final exam (75%) and the take-home assignments (25%). Intelligent class participation will contribute at the margin. As an option, students can reduce the weight of the final exam by writing a review paper on a theme less covered in the course.

TI147 BAYESIAN ECONOMETRICS

Instructor: Prof. R. Paap (EUR)

Short subject description:
This course provides an extensive introduction in Bayesian econometrics. It covers the Bayesian concepts and simulation techniques necessary to perform modern Bayesian analyses.

Course description:
Bayesian Econometrics plays an important role in quantitative economics, marketing research and finance. This course discusses the basic tools which are needed to perform Bayesian analyses. It starts with a discussion on the difference between Bayesian and frequentist statistical approach. Next, Bayesian parameter estimation, forecasting and Bayesian testing is considered, where we deal with univariate models, multivariate models and panel data models (Hierarchical Bayes techniques). To perform a Bayesian analysis, knowledge of advanced simulation methods is necessary. Part of the course is devoted to Markov Chain Monte Carlo sampling methods including Gibbs sampling, data augmentation and Monte Carlo integration. The topics are illustrated using simple computer examples which are demonstrated during the lectures.

Course objective:
After following the course, students are able to understand scientific articles in marketing, economics and finance, where Bayesian analysis is applied. Furthermore, they are able to apply and implement a Bayesian analysis in packages like Matlab or Ox and the program Winbugs.

Literature:
- Slides provided during the lecture
- Greenberg, E. (2013). Introduction to Bayesian Econometrics, Cambridge University Press, 2nd edition
- Selected papers

Course entrance requirements: Econometrics I + II

Assessment: Sit-in written examination (100%).

TI119 BEHAVIORAL FINANCE

Instructors: Prof. M.J. van den Assem (VU; coordinator), Dr F. Peters (UvA), and Prof. R.C.J. Zwinkels (VU)

Short subject description:
The objective of this course is to provide a comprehensive introduction to Behavioral Finance. This relatively new field integrates insights from Psychology into Finance to better understand and predict the behavior of individual investors, decision making in firms, and the dynamics of financial markets.

Course contents:
Behavioral Finance extends the traditional Finance framework with three important building blocks:

- Non-standard beliefs. Individuals are subject to distortions or biases in their beliefs and expectations such as overconfidence and optimism.
- Non-standard preferences. Individuals can have risk preferences that are not understood in a normatively acceptable framework, and exhibit for example loss aversion and narrow framing.
- Limits to arbitrage. Financial market participants are subject to certain costs and risks that prevent full arbitrage. As a result, market anomalies can occur.

The lectures will describe the original evidence from Psychology, discuss the related empirical evidence in Finance and Economics, and explain how these findings can be incorporated into models of financial decision making and financial markets.

Course objective:
At the end of this course, students are aware of the main elements of Behavioral Finance. They understand how these elements help to explain empirical regularities that are puzzling within the traditional framework of rational economics, and how these elements can be integrated into economic models.

Literature: Selected papers.

Assessment: Sit-in exam (80%) + written essay (20%).

TI126 BEHAVIORAL MACROECONOMICS

Instructor: Prof. C.H. Hommes (UvA)

Short subject description:
The leading paradigm in macroeconomics assumes that economic agents (households, firms, investors) are perfectly rational in making their decisions. Experimental evidence and common sense indicate that this assumption is often too demanding. This course focuses on the analysis of macroeconomic models under “bounded” rationality, where agents violate full rationality but behave more in accordance with experimental evidence.

Course content:

- Animal spirits and boom and bust cycles
- Bounded rationality and adaptive learning
- Complex dynamics, chaos and bifurcations
- Heterogeneous expectations and evolution in asset pricing and macroeconomic models
- Macro laboratory experiments
- Monetary policy and asset prices under bounded rationality

Course objective:

After the course students should be familiar with bounded rationality, adaptive learning and heterogeneous expectations and be able to apply these concepts to behavioural macroeconomic modelings.

Literature:

- C.H. Hommes (2013). *Behavioral Rationality and Heterogeneous Expectations in Complex Economic Systems*, Cambridge University Press, http://www.cambridge.org/gb/knowledge/isbn/item6945169/?site_locale=en_GB
- P. De Grauwe (2012). *Lectures on Behavioral Macroeconomics*, Princeton University Press, http://press.princeton.edu/titles/9891.html
- Selected papers

Course entrance requirements:
Recommended: Complexity & Behavior, Mathematics I + II

Assessment: Written sit-in exam (40%), 2 assignments (20% each), and essay (20%).

TI127 COMPLEXITY AND BEHAVIOR

Instructors: Prof. C.H. Hommes (UvA) and Dr H. Houba (VU)

Short subject description:
The leading paradigm in economic theory assumes that *all* economic agents (households, firms, investors) are perfectly rational in making their decisions. This leads to the standard representative rational agent model. In this course we consider the economy as a complex system with interacting boundedly rational heterogeneous agents. A central question will be: which emerging aggregate macro behavior arises through the interactions of individual decisions of boundedly rational heterogeneous agents at the micro level?

Course content:

- Introduction to complex dynamics, chaos and bifurcations
- Animal spirits and boom and bust cycles
- Adaptive expectations, learning and heterogeneous expectations
- Contagion and the evolution of trust
- Agent-based models
- Macro laboratory experiments

Course objective:
After the course students will be familiar with some basic concepts of complexity, bounded rationality and heterogeneous agents and they will be familiar with some applications in macro-economics, and finance.

Literature:

- C.H. Hommes (2013). *Behavioral Rationality and Heterogeneous Expectations in Complex Economic Systems*, Cambridge University Press, http://www.cambridge.org/gb/knowledge/isbn/item6945169/?site_locale=en_GB
- Selected papers

Course entrance requirements:
Recommended: Mathematics I + II

Assessment: F = 1/2·EX + ¼ A + ¼ ES, where EX= mark final exam, A=average mark for the 2 assignments and ES=mark final essay.

TI174 COURSE ON CENTRAL BANKING

Instructors: Prof. E.C. Perotti (UvA) and Prof. S.J.G. van Wijnbergen (UvA)

Short subject description:
To be announced.

Course contents:
To be announced.

Course objective:
To be announced

Literature:
To be announced

Course entrance requirements:
To be announced

Assessment: To be announced

TI032 DEVELOPMENT ECONOMICS

Instructors: Prof. C.T.M. Elbers (VU) and Prof. M.P. Pradhan (VU)

Short subject description:
This course provides an advanced treatment of a number of core issues in Development Economics.

Course contents:
In the course the following topics are covered: 1) welfare, poverty and worldwide inequality, (2) development and risk, (3) development and informality, (4) the use of randomized trials in development, and (5) the search for the drivers of development – institutions, human capital, foreign aid, poverty traps and chance.

Course objective:
This course familiarizes students with a number of core issues in Development Economics. After the course, students should demonstrate knowledge and understanding of the economic principles underlying these core issues. Also they should have developed a good understanding of available empirical strategies to analyze these issues in practice and to have the ability to derive the policy implications from the theoretical and empirical analyses.

Literature: Selected papers.

Course entrance requirements: Microeconomics I, Macroeconomics I, Statistics and Econometrics I + II

Assessment: Oral exam or sit-in written examination (depending on student numbers (75%) and class participation and student assignments/presentations (25%).

TI106 DYNAMIC CORPORATE FINANCE

Instructor: Dr S. Gryglewicz (EUR)

Short subject description:
This course provides an advanced introduction to the methods and results of dynamic corporate finance theory.

Course contents:

The course introduces students to fundamental models of corporate finance in a dynamic world. To provide some essential background, the course will start with an applied introduction to stochastic processes and stochastic calculus. Topics that will be covered include investment, capital structure, dividend policy, and agency conflicts. In later parts, we will study how these dynamic corporate finance models can be linked to valuation and asset returns. Finally, the course will discuss empirical estimation of structural models in corporate finance.

Course objective:
After the course students can critically analyze and develop dynamic models of corporate finance and understand the methods for empirical estimation of these models.

Literature: Selected papers.

Course entrance requirements:
Required: none
Recommended: Microeconomics I – III and Corporate Finance Theory

Assessment: Sit-in written exam (3 hours; 60%, at least 5,0 required), discussion points (10%), active participation in classes (10%), written research proposal (20%).

TI128 ECONOMICS OF NETWORKS

Instructors: Dr M.J. van der Leij (UvA) and Dr I.D. Lindner (VU)

Short subject description:
Many economic interactions are embedded in a network of social and economic relationships, shaping economic behavior and outcomes. This course covers economic models that have an explicit role for social and economic networks and social interactions in explaining economic behavior.

Course contents:
The course consists of two parts.
(I) The first two weeks will equip you with a toolbox of network concepts and modeling techniques. The following topics will be discussed: network concepts; complex network models; strategic network formation; diffusion through networks; learning and networks.
In this first part of the course we will work with a flipped classroom concept. This implies that we will ask you to watch parts of the massive open online lectures of Matthew Jackson, Stanford University, in preparation of these meetings. This allows us to use the classroom sessions entirely for training purposes. We will summarize the findings, address your problems and discuss exercises. We will round up this part by a midterm examination in week 3.
(II) Week 4 to week 7 of the course consists of presentations and discussions by participating students. These articles will be related to social and economic networks on topics such as game theory, social coordination and social learning, diffusion of innovation, labor markets, financial markets, trade, etc. Feel most welcome to let us know our interests. With this information, we can make sure that you will be assigned papers that are most suited to your research goals.

Course objective:
After the course students are able to explain the importance of including network interactions in explaining economic behavior; analyze simple examples of network models; explain different types of theoretical and empirical network methodologies; critically evaluate such methodologies; and develop new lines of research on network economics, either theoretically or empirically.

Literature:
- Jackson, M.O (2010). *Social and Economic Networks*, Princeton University Press, Available as paperback or ebook
- *Social and Economic Networks,* Massive Open Online Course (MOOC), available at www.coursera.org.
- Selected papers

Note that the MOOC at coursera.org is free of charge unless you want to earn a certificate from coursera.org (which is not necessary for our course). All you have to do is open an account at coursera.org.

Course entrance requirements:
Required: Mathematics I
Recommended (optional): Complexity and Behavior, Microeconomics II, Statistics

Assessment:
The final grade consists of:
the midterm exam in week 3 which accounts for 30% of the final mark.
an individual presentation of a paper and a discussion of another paper. The result of this examination accounts for 20% of the final mark.
An individual research proposal on a topic of social or economic networks to be submitted not later than 15 January 2018. The result of this examination accounts for 50% of the final mark.
In your own interest, we can help you to find a paper for individual presentation that is related to your envisaged research proposal.

The final grade is a weighted average of all marks above, and each of them has to be 5.0 or higher. In case of one or more insufficient marks, students have to resubmit the relevant item. Results of other subparts remain valid in the academic year in which the course is taken.

TI154 ECONOMICS OF EDUCATION

Instructors: Prof. E.J.S. Plug (UvA) and Prof. H. Oosterbeek (UvA)

Short subject description:
This course discusses recent developments in the empirical analysis of economics of education.

Course contents:
Papers on various topics including returns to education, effects of class size, education for gifted students, school assignment models, intergenerational mobility and peer effects.

Course objective:
After the course students have up-to-date knowledge of important research issues in the economics of education and they are aware of the importance of identifying assumptions.

Literature: Selected papers.

Course entrance requirements: None

Assessment: Participation in class (50%), final paper (50%).

TI105 EVOLUTIONARY GAME THEORY

Instructor: Prof. C.M. van Veelen (UvA)

Short subject description:
The goal of this course is to understand the basic principles of evolutionary dynamics and evolutionary game theory, and to be able to apply that in order to understand how evolution shapes human behavior in general and behavior in economic situations in particular.

Course contents:
We will learn to use static equilibrium concepts, such as the evolutionary stable strategy (ESS), dynamic concepts, such as the replicator dynamics, and the relation between the two. In finite population settings, we also learn what the Moran process is, and get accustomed to evolutionary

graph theory.
We will also encounter kin selection, group selection and sexual selection – both Zahavi's handicap principle and Fisher's runaway process – in order to understand possible explanations for pro-social behavior. Also behavior in repeated games and the evolution of reciprocity will be discussed in order to understand laboratory findings concerning human behavior.

Course objective:
The course is meant to teach the student both mathematical techniques for evolutionary dynamics as well as ways in which those can help formulate predictions for human behavior.

Literature:
- Weibull, J.W. (1995). *Evolutionary Game Theory,* MIT Press, Cambridge, MA
- Nowak, M.A. (2006). *Evolutionary dynamics: exploring the equations of life,* Harvard University Press, Cambridge, MA

Course entrance requirements: none.

Assessment: Sit-in written exam (50%) and an assignment / project (50%).

TI161 EMPIRICAL ASSET PRICING

Instructors: Dr E. Eiling (UvA), Dr A. Andonov (EUR) and Dr Q. Mao (EUR)

Short subject description:
Empirical Asset Pricing studies the time-series and the cross-sectional behavior of asset prices. The field is highly relevant for research in financial economics. It is the basis for any study in investments and also fundamental to many financial management applications such as risk management, portfolio selection and performance evaluation. The course consists of 7 lectures.

Topics by lecture:
1. Investment and consumption-based asset pricing (Mike)
2. Cross-section of stock returns (Mike)
3. Time-series return predictability (Esther)
4. The cross-section and time series of currency returns (Esther)
5. Mutual funds and alternative investments (Aleks)
6. Behavioral asset pricing (Aleks)
7. Student presentations (all present)

Course objective:
Students who successfully complete this course will have an in-depth overview of important and broad literatures in the field. Students will become familiar with empirical methods in addressing related research topics.

Literature:
Compulsory: lecture notes and selected articles
Background literature:
P: Pennacchi, G. (2008). Theory of Asset Pricing, Addison-Wesley
CLM: Campbell, J.Y, A.W. Lo, and A.C. MacKinlay (1997). The Econometrics of Financial Markets, Princeton University Press
C: Cochrane, J. (2005). Asset Pricing (revised edition), Princeton University Press (Background reading material)

Course entrance requirements:
To be announced

Assessment:
To be announced.

TI155 EXPERIMENTAL ECONOMICS

Instructors: Prof. J.H. Sonnemans (UvA) and Dr J. van de Ven (UvA)

Short subject description:
Experimental Economics studies economic behavior in a controlled, laboratory or field environment.

Course objective:
This course intends to teach the student how to design an experiment aimed at answering a self-developed research question. In addition, it gives an overview of recent trends in Experimental Economics. The course will focus around a set of recent experimental papers and on experimental designs developed by the students.

Literature: Selected papers.

Course entrance requirements: Microeconomics III and IV

Assessment: Each student is expected to actively participate in classes and to develop an experimental design of his or her own. The grade is determined by a presentation of the design (30%) and by a written proposal of the design (70%).

TI156 FINANCIAL CRISES

Instructor: Prof. S.J.G. van Wijnbergen (UvA)

Short subject description:
We use an analysis of the recent subprime crisis as an introduction towards a more general anatomy of Financial Crises and discuss desired and actual ex ante and ex post policy responses

Course contents:
Overview of the subprime crisis; how a relatively small problem in the US mortgage market triggered a worldwide financial meltdown. Key words: Financial innovation and the fragility of the international banking system; theory of banking crises, optimal bank intervention; regulatory reform; macroeconomics and financial fragility, macroeconomic impact of tighter financial regulation; financial crises and growth. Macropolicy during the great recession (fiscal deficits, Quantitative Easing and other Unconventional Monetary Policies).

Course objective:
Students are introduced to current research and new insights in the economics of financial crises.

Literature: Selected papers.

Course entrance requirements:
Recommended but not absolutely required: Asset Pricing, Corporate Finance, Macroeconomics IV

Assessment: final exam, mandatory class attendance.

TI157 HEALTH ECONOMICS

Instructors: Prof. O.A. O'Donnell (EUR) and Prof. M. Lindeboom (VU)

Short subject description:
Health is strongly correlated with socioeconomic characteristics such as education, income and wealth. Understanding these correlations is a major challenge for economics and other social

sciences. This course explores the nature, causes and consequences of the association between health and socioeconomic factors.

Course Contents:
The course starts with the description of health inequalities and the normative distinction between fair and unfair health inequality drawing on models of equality of opportunity in health. Causality in the direction from socioeconomic factors to health is considered within the framework of the Grossman model of health capital. Exploring causality from health to income involves examination of the role of health in employment and retirement decisions, while allowing for the possibility that work impacts on health. The hypothesis that health and socioeconomic outcomes in adult life and old age result from long run mechanisms that originate very early in life is explored before turning attention to socioeconomic differences in health behavior, such as smoking.

Course objective:
The intention is to familiarize students with the core economic literature on the causes and consequences of socioeconomic differences in health. On completion of the course, students should have the ability to evaluate both normative approaches to the distribution of health and positive models of health behavior. They should be able to appraise the validity of evidence on the causal relationships between health and socioeconomic factors. A further objective is to improve students' ability to present a concise, clear written argument or critique of literature.

Literature: Selected papers.

Course entrance requirements: Microeconomics I to IV, Applied Microeconometrics I + II

Assessment: Take-home exam.

TI163 HISTORY OF ECONOMIC THOUGHT

Instructor: Prof. R.E. Backhouse (Un. of Birmingham)

Short subject description:
The aim of this course is to provide a historical perspective on ideas relevant to modern economics.

Course description:
It will cover the history of important ideas in microeconomics, macroeconomics and empirical methods, and further topics may be added (e.g. on applied fields, or on pre-20th century economics) to reflect the interests of students taking the course. A frequent theme will be that the writings of earlier generations of economists were frequently much less naïve than they are often made out to be, and in some cases economists held views diametrically opposed to those with which they are often associated. For example, Maynard Keynes did not attribute unemployment to sticky wages; Keynesian economists of the 1950s and 1960s understood the potential for high demand to create accelerating inflation.
Sessions will involve a mixture of lecturing and discussion, and students will be expected to do a limited amount of reading to discuss this material. More extensive reading will then be required for assignments, of which the major one will be an essay related to students' research interests, the topics for which will be worked out in consultation with the teacher.
Topics that could be covered as part of the core include: the history of general equilibrium theory, game theory and welfare economics; the Keynesian revolution and monetarism; the history of the Phillips curve and DSGE modeling; the history of econometrics and empirical methods.

If possible, a meeting will be arranged prior to the start of the course to find out students' interests before the syllabus for the year is finalized.

Literature:
There is no textbook for the course, but useful preparatory reading includes:

- Roger E. Backhouse The Penguin History of Economics (2002) - this provides a broad account of economics since ancient Greece; coverage of economic theory is limited and it goes much further back in time than the course is likely to do but it should provide a broad perspective.
- Roger E. Backhouse “United States, Economics in, since 1945”, in S. Durlauf and L. Blume (eds) The New Palgrave Dictionary of Economics, second edition, online at http://www.dictionaryofeconomics.com. (This needs to be accessed through an library that subscribes.)

Samples of the historical literature likely to be covered. Asterisks denote articles where the authors have subsequently written an important book on the subject, but earlier articles, available online, are provided here for convenience.

- Roger E. Backhouse “Revisiting Samuelson’s Foundations of Economic Analysis”, Journal of Economic Literature, 2015, 53(2): 326-50.
- Roger E. Backhouse and Steven Durlauf “Robbins on Economic Generalizations and Reality in the Light of Modern Econometrics”, Economica, 2009, 76: 873-90.
- James Forder “Friedman's Nobel Lecture and the Phillips Curve Myth”, Journal of the History of Economic Thought, 2010, 32(3): 329-348.*
- E. Roy Weintraub, “Lionel W. McKenzie and the Proof of the Existence of a Competitive Equilibrium”, Journal of Economic Perspectives, 2011, 25(2): 199-215.*
- Robert J. Leonard, 1995. "From Parlor Games to Social Science: Von Neumann, Morgenstern, and the Creation of Game Theory, 1928-1994," Journal of Economic Literature, 1995, 33(2), pages 730-761, June.*
- Kevin Hoover “Microfoundational programs”, in Duarte and Lima (eds) Microfoundations Reconsidered: The Relationship of Micro and Macroeconomics in Historical Perspective. http://public.econ.duke.edu/~kdh9/.

Course entrance requirements: none

Assessment: One essay, the topic for which will be decided in consultation with the teacher.

TI038 INDUSTRIAL ORGANIZATION

Instructor: Prof. J.L. Moraga-Gonzalez (VU)

Short subject description:
Many markets of interest are dominated by a few firms. These firms not only choose their prices but also the quality and the design of their products. They engage in advertising campaigns and make investments in R&D. They also decide to enter or exit markets, to merge or not with other firms, to vertically integrate or not with other firms in the value chain, to collude with rival firms etc. These choices have far-reaching effects on the markets in which they operate and these effects may have wider repercussions throughout the economy. This course presents an approach - based on strategic decision making - for understanding the functioning of such markets. We also use this approach to clarify the role of the government in regulating economic activity.

Course contents:
1 Models of imperfectly competitive markets
    1.1 Homogeneous product markets
    1.2 Differentiated product markets
    1.3 Information issues: imperfect price information and private cost information
2 Collusion and leniency programs
    2.1 Recent cartel cases
    2.2 Main mechanisms behind collusion
    2.3 Formal game theoretical models of collusion
    2.4 Factors that facilitate collusion and their impact on sustainability of collusion

2.5 Impact of Antitrust Policy instruments (e.g. Leniency Programs) on incentives to collude

3 Price discrimination
- 3.1 First degree price discrimination
- 3.2 Third degree price discrimination
- 3.3 Second degree price discrimination
- 3.4 Other discriminatory practices (intertemporal price discrimination, damaged goods, obfuscation strategies, etc.)

4 Research and Development
- 4.1 Market Structure and Technological Innovation
- 4.2 Collaboration and cooperation
- 4.3 R&D Networks

5 Advertising
- 3.1 Persuasive advertising
- 3.2 Informative advertising
- 3.3 Advertising as a signal
- 3.4 Application: internet platform advertising

6 Consumer search
- 6.1 Search in homogeneous product markets
- 6.2 Search in differentiated product markets
- 6.3 Applications

7 Vertical relations
- 7.1 Double marginalization
- 7.2 Vertical mergers and foreclosure

Course objective:
The objective of the course is to familiarize the student with the workhorse models employed in Industrial Organization to address strategic interaction in oligopolistic markets.

Literature:
Compulsory:
- Tirole, J. (1988). *The theory of Industrial Organization*, MIT Press

Recommended (optional):
- Pepall, Richards and Norman (2005). *Industrial Organization: Contemporary Theory and Practice*, South-Western
- Motta (2004). *Competition Policy: Theory and Practice*, Cambridge University Press
- Scherer and Ross (1990). *Industrial Market Structure and Economic Performance*
- Martin, S. (1993). *Advanced Industrial Organization*, Blackwell

Course entrance requirements: Microeconomics I and II

Assessment: Sit-in written exam (50%) and problem sets (50%)

TI078 INSTITUTIONS AND FINANCIAL STRUCTURE

Instructor: Prof. E.C. Perotti (UvA)

Short subject description:
This course reviews selectively the novel literature on comparative financial systems.

Course contents:
It covers theoretical and empirical explanations for the time series and cross country variation in the structure of governance, regulation and access across financial systems.
The recent literature on institutional development recognizes that financial contracting and governance depends on “the rules of the game” and the nature of their enforcement. As these are shaped by political, legal and cultural institutions, disentangling their specific channels is a fine scientific challenge.
While the topics are broad, the course seeks a rigorous approach based on structural models to

explain both the cross country variation in financial structure as well as their historical evolution. The intent is to build a framework drawn from the literature in institutions and growth, grounded in the methodology of corporate finance and political economy theory.

Course objective:
The course will make students aware of the literature on institutions and its methodology. At the end of the course students should be able to use models of political economy and incomplete contracting as microfoundations for work on development and growth, financial development and macroeconomic stability.

Literature:
Compulsory: Selected papers
Recommended: Selected papers

Course entrance requirements:
Required: Microeconomics I + II
Recommended: Microeconomics III and Corporate Finance Theory

Assessment: Sit-in written examination (75%) and homework assignments (25%). At the margin, intelligent class participation will make a difference.

TI034 INTERNATIONAL ECONOMICS

Instructors: Prof. F.J.G.M. Klaassen (UvA) and Dr J. Emami Namini (EUR)

Short subject description:
International Economics is concerned with economic relations between (inhabitants of) different countries. This course studies basic topics (foundations) of modern international economics, regarding trade as well as finance.

Course contents:
International interdependencies have long been important for economic policy, and globalization has further strengthened that relevance. This holds not only for small open economies, such as the Netherlands, but also for Europe and worldwide. This course provides basic insights based on micro foundations to better understand such interdependencies, both from a theoretical and empirical viewpoint. The course covers international trade as well as international finance.
The international trade part starts with a discussion of the classic trade models (Ricardo, Heckscher-Ohlin). Subsequently we will cover more recent new trade theory with a particular focus on trade in intermediates, and the consequences of the emergence of global supply chains. Finally, the discussion of these influential trade theories will be complemented by an overview of (very) recent empirical work using, or testing, some of the most important theoretical predictions.
The international finance part of the course starts from the view of the current account as a vehicle for intertemporal trade, driven by optimizing behavior of agents, which helps to analyze topics such as sustainability of foreign debt. We also discuss interest rate parities, risk premium, floating nominal exchange rates, speculative attacks on fixed rates, exchange rate volatility under sticky prices, how to quantify pressure on the forex market whatever the exchange rate regime is, and how such insights can be used in research, in terms of both empirical and theoretical (DSGE) modeling.
Students also have to write a short academic essay in which they apply a theory to a real-life event, for example.

Course objective:
After the course students will better understand the impact of foreign countries on the domestic economy, and they will have some tools to incorporate these interdependencies in theoretical and empirical models. The course also develops the students' academic writing skills.

Literature: to be announced

Course entrance requirements: None

Assessment: Sit-in written examination (about 80%) and essay (about 20%).

TI029 LABOR ECONOMICS

Instructors: Dr H.G. Bloemen (VU) and Dr S. Hochguertel (VU)

Short subject description:
Part I covers empirical applications (with, where appropriate, theoretical foundations) of microeconomic models of labor supply.
Part II focuses on the empirical implementation and estimation of structural job search models.

Course content:
Understanding the mechanisms and assessing the empirical importance of features of the labor market is of eminent importance to economists.
The first part (Hochguertel) covers various models of labor supply, ranging from individual to household, from static to intertemporal models. Interactions with tax and benefit systems will be emphasized. The second part (Bloemen) deals with structural microeconomic applications of job search models. It covers the classical job search model, models with on-the-job search, matching-bargaining, and equilibrium search models.
Both parts also pay attention to methods of estimation for various models. The outcomes of several empirical studies will be discussed.

Course Objective:
Overall objective of the course is to introduce the student to a couple of selected and important strands in the vast empirical microeconomic literatures on labor economics. We focus on salient aspects of labor supply and job search.
Upon completion of the course, the student will

- Have gained substantive insights in the economic motivation and modeling of labor supply responses to changes in wages, taxes, policies, and to income shocks
- Know of important subareas in the domain of the labor supply literature (among which, female labor supply or household labor supply) and some of the main empirical and theoretical issues
- Know of pertinent approaches to structural econometric work to estimate various labor supply elasticities, and be able to discuss alternative identification strategies in natural experiment settings
- Be able to understand the link between theory and empirical implementation and appreciate some of the challenges in bringing theoretical reasoning to bear on economic data.
- Be able to recognize the specific econometric problems that emerge in implementing structural job search models.
- Be able to express the tight relationship between the economic model and the likelihood function.
- Be familiar with the implementation of specific extensions, for instance endogenous search intensity or non-wage characteristics
- Be able to extend the standard job search model with on-the-job search, estimation with unobserved heterogeneity and multiple spell data.
- Be aware of the empirical implications of including firm and worker heterogeneity in equilibrium search models.

Literature: Selected papers.

Course entrance requirements:
Required: Microeconomics I, Macroeconomics III, Statistics and Econometrics I + II

Assessment: Sit-in written examination (75%), participation and homework assignments (25%).

TI165 LAW AND ECONOMICS

Instructor: Prof. G. Dari-Mattiacci (UvA)

Short subject description:
Law & Economics studies the economic effects of legal rules and legal institutions and their evolution over time. This course focuses on the most fundamental legal institution of our times: the business corporation, that is, a firm with "legal personality". It unveils its origin, historical evolution and functions in a modern economy and explains the reach of an economic theory of legal entities.

Course contents:
This course brings the students to the cutting edge of research in Business Law & Economics. The course starts with an analysis of property rights and their importance for industrial organization and the theory of the firm. It then explores the economics of corporations, their essential differences with respect to unincorporated firms and the problem of dissolution through bankruptcy. The course focuses in particular on four features of the corporations, which have "proprietary rights" nature and are attached to the corporation's qualification as a "legal entity". Building on the economic theory of the firm, this course illustrates a theory of why some firms incorporate, what this means for property and contracts and for the market in general. The course builds on very recent contributions in legal scholarship, finance and economics.

Course objective:
This course presents an economic theory of legal entities and unpacks the fundamental features of the corporation (a firm with legal entity status) examining their origins, evolution and functions in modern western economy. The most used and innovative theories are examined in detail and students will learn how to work with them. The material treated during the course is meant to give the students a perspective on current research trends and hot topics. This course is highly complementary to courses in corporate finance, contract theory, political economy and industrial organization.

Literature:
Selected papers.

Course requirements:
Recommended (optional): first year courses

Assessment: Each student is expected to write a research plan for a law & economics analysis on a problem chosen by the student and approved by the lectures. The proposal should include motivation, research questions, basic legal background, details of the methodological approach (theoretical, empirical or both), and expected contribution to the literature. The research plan should be 5 to 10 pages long, concisely written. The idea is to draw a roadmap for a possible research paper or a larger study. It should be clearly stated what the challenges of the research are and how they will be tackled. Students who write innovative research plans might be able to use them in funding applications. Research proposals should be handed in via Blackboard (there is an automatic plagiarism check) within two weeks from the last class. In addition, in each of the classes 2-6, a student will give a short presentation on an article assigned by the instructor. All students are expected to give at least one presentation. In the last class, students will present their research proposals. These presentations are a condition for passing the course but do not count for the grade.

TI169 MARKET & SYSTEMIC RISK MANAGEMENT

Instructor: Prof. C.G. de Vries (EUR)

Short subject description:

The main objective of this course is to develop a coherent framework for evaluating market risk at the levels of individual asset, portfolios of assets, banks and insurers and the macro economy. The main tool that we exploit in devising this framework is the statistical theory about tail risk from Extreme Value Theory (EVT) in combination with standard concepts from finance and macroeconomics.
In particular, the course offers different methods to manage financial risk with special emphasis on downside risk measures such as Value-at-Risk (VAR), Expected Shortfall (ES), semi-variance, CVaR, Stress tests, worst case scenario analysis, etc. Various statistical techniques are studied for analyzing heavy-tailed distributions, especially their convolution properties. The heavy-tail feature refers to the phenomenon that very bad outcomes occur more frequently than the normal distribution predicts. The techniques are used to estimate and manage downside risk, both at individual asset level and portfolio level. Subsequently, we investigate the EVT for the sake of stress testing and scenario analysis. Given the link between individual risk management and stability of the financial system, we also pay attention to various aspects of risk management from a supervisory point of view. The inherent fragility of the financial system is explained and tools for measuring systemic stability are developed.
Students have to conclude empirical homework as well as addressing theoretical questions. A PC lab session is held to implement the novel techniques, using market data. The rigorous treatment of some of the techniques enables students to independently analyze market and systemic risk.

Course contents:
Lecture 1: Introduction, Motivation, Heavy Tail Evidence; Feller's Convolution Theorem
Lecture 2: Application of Feller's Theorem to Risk Measures; Extreme Value Theorem
Lecture 3: Cross Section and Time Dependence; Univariate Estimation
Lecture 4: Systemic Risk; Bivariate Estimation
Lecture 5: Lab Session
Lecture 6: Applications to Value at Risk, Systemic Risk
Lecture 7: Overflow, Research and Recap

Course objective:
At the end of this course students are able to:

- Identify the rigorous and quantitative techniques available in analyzing market and systemic risk
- Use various statistical techniques specifically designed to measure downside tail risk
- Identify and handle the additive properties of heavy tailed distributions both over time and in a cross section
- Select and use appropriate techniques to manage portfolio tail risk
- Develop indicators for evaluating the stability of the financial system

Literature:
Compulsory: Lecture notes
Recommended (optional): McNeil, Frey and Embrechts (2005). *Quantitative Risk Management*, Princeton

Course entrance requirements: tba

Assessment: Conditional on passing the written exam, the final grade is composed of assignments (25%), lab exercises (25%), and a written exam (50%).

TI130 MECHANISM DESIGN AND MARKET INSTITUTIONS

Instructor: Dr S. Onderstal (UvA)

Short subject description:
Mechanism design concerns establishing institutional rules that maximize the designer's objective under the constraint that the involved parties or individuals possess private information and may take private actions in their own interests. The objective of the mechanism designer can be to

maximize social welfare, efficiency, or any kind of monopoly rent. Because of its practical importance, mechanism design theory has been on the top research agenda for almost half of a century. It is arguably one of the most successful areas in Applied Micro-economics witnessing the Nobel Prizes that were awarded to William Vickrey and Jim Mirrlees in 1996, Leonid Hurwicz, Roger Myerson, and Eric Maskin in 2007, Lloyd Shapley and Al Roth in 2012, and Jean Tirole in 2014.

Course contents:

1 Introduction, auctions
2 Revenue maximizing mechanisms, cartels
3 Incentives in organizations, procurement design
4 Bilateral trade, public goods, and efficiency
5 Matching markets
6 Case study: School matching
7 Case study: 3G and 4G mobile telecommunications auctions

Course objective:
The objective of this course is two-fold. Firstly, students will sharpen their knowledge about the basic notions of mechanism design theory such as the revelation principle, incentive compatibility, and individual rationality constraints, as well as second-best solutions as a fundamental result under incomplete information. Secondly, students will be exposed to several applications of mechanism design including auctions, bilateral trade, public goods, organizational design, school matching, and kidney exchange. After this course, students will be equipped with up-to-date knowledge and a more profound understanding of how and why some standard market institutions prevail in practice, while being able to discern possible causes for market failures in other situations.

Literature:

- Matthews, S. A. (1995). A technical primer on auction theory I: Independent private values. Center for Mathematical Studies in Economics and Management Science, Northwestern University.
- Selected papers

Assessment: Take-home Assignments (30%) + Essay (50%) + Presentation (20%). Students write and present an essay about pre-selected practical market design problems.

TI080 PUBLIC FINANCE

Instructor: Prof. B. Jacobs (EUR)

Short subject description:
This course gives an in depth introduction into normative welfare economics, including optimal taxation, optimal income redistribution, optimal public-good provision and optimal corrective taxation.

Course contents:
We will discuss the Ramsey principles for optimal commodity taxation and Mirrlees' (1971) non-linear income tax. The main theorems of public finance will be covered: the Atkinson-Stiglitz theorem on the desirability of commodity/capital taxation and the Diamond-Mirrlees production efficiency theorem. The Samuelson-rule for the optimal provision of public goods in second-best settings with distortionary taxes will be discussed. Main principles will then be applied to various topics: optimal income redistribution, environmental taxation and the double dividend, capital income taxation, education policies and redistribution, government debt and fiscal policy, and the marginal cost of public funds.

Course objective:
The aim of this course is to give students a thorough background in the principles of public finance and to apply these principles to questions like: How progressive should the income tax be? Should

the government employ indirect taxes besides the income tax? Should labour participation be subsidized? Should the government subsidize education? How does taxation affect human capital investment and how does this affect the progression of the income tax? How should the government set the optimal capital tax? How much public goods should the government provide and should less public goods be provided if taxation is more distortionary? How should the government internalize externalities, for example in the environment? After this course students should be able to understand

- the optimal non-linear income tax
- the optimal participation tax
- the optimal commodity tax and the debate on direct vs. indirect taxation
- the optimal tax on capital income
- the optimal taxation of human capital
- the optimal provision of public goods and the marginal cost of public funds
- the optimal corrective tax on externalities

Literature:
The main text is the book by Bas Jacobs (2017), *Principles of Public Finance*. A pdf of the book, additional reading and class materials will be made available on Blackboard.

Entrance requirements: Microeconomics I

Assessment: Sit-in written examination (70%) and written assignments (30%).

TI132 PUTTING BEHAVIORAL ECONOMICS TO WORK

Instructor: Prof. U. Gneezy (UCSD/UvA)

Short subject description:
The class will have two goals. First, we will discuss ways to translate scientific findings from behavioral economics into the real world. We will discuss small changes that can make big differences in business and policy. The second goal is to learn how to design simple field experiments to measure the impact of changes correctly, and the importance of understanding causality in behavioral interventions

Course contents:

- Incentives and behavior change
- Behavioral pricing
- Field experiments in business and in policy
- Shared Social Responsibility

Course objective:
Students should be familiar with ways to use behavioral economics findings in business and policy. A focus would be put on using field experiments in such behavioral interventions, and ways to make these experiments compatible with scientific publications. That is—how to use behavioral economics to influence the world while producing meaningful research.

Literature:

- Gneezy, U. and J.A. List. *The Why Axis*
- Gneezy, A., Gneezy, U. & Lauga, D. (2014). *Reference-Dependent Model of the Price-Quality Heuristic*, Forthcoming in Journal of Marketing Research
- Gneezy, A., U. Gneezy, G. Riener and L.D. Nelson (2012). *Pay-what-you-want, identity, and self-signaling in markets*, Proceedings of the National Academy of Sciences,109(19),7236-7240
- Gneezy, U., Meier,S., &. Rey-Biel,P. (2011). *When and Why Incentives (Don't) Work to Modify Behavior*, Journal of Economic Perspectives, 25(4), 191-209
- Gneezy, A., U. Gneezy, L.D. Nelson, and A. Brown (2010). *Shared Social Responsibility: A Field Experiment in Pay-What-You-Want Pricing and Charitable Giving*, Science,

329(5989), 325-327

Course entrance requirements: Experimal Economics

Assessment: Class participation, presentation at the end of class and a research paper after the class.

TI133 REGIONAL AND ENVIRONMENTAL ECONOMICS

Instructors: Prof. H.L.F. de Groot (VU) and Dr S. Poelhekke (VU)

Short subject description:
The course combines trade theory and empirical methods to shed light on current real economic issues such as natural resource wealth, pollution havens, the natural resource curse, and climate policies and their impact on competitiveness.

Course contents:
Three main topics are covered in the lectures: the impact of environmental policies on location behavior and competitiveness, the economics of natural resource-rich countries, and trade and the environment.The first series of classes address the issue of regional economics with special emphasis on the interplay between environmental policies, location behavior and the allocation of economic activity across the globe. Building on this approach, we will examine the pollution haven hypothesis and discuss whether trade is good or bad for the environment, touching upon environmental policy making. Finally, we will examine trade in natural resources and the diverse economic outcomes in resource-rich economies. Mainstream explanations of a possible 'resource curse' such as Dutch disease will be presented. But how strong is the evidence for a 'curse' and what are other competing explanations for unfavorable economic development? Finally, these lectures cover the latest state-of-the-art research which has moved from cross-country to within-country analysis of resource-rich economies.

Course objective:
After the course students are have a good understanding about the linkages between production technology, location behavior, natural resources, and sustainability; are able to work with economic models to analyze the dependence between natural resource and the economy, and to study the effects of environmental policy; have a good understanding of the economic challenges faced by resource-rich economies.
The course brings students to the forefront of research in these fields and discusses methods and ideas that will help students develop research of their own.

Literature:
Compulsory:

- Fernando M. Aragón and Juan Pablo Rud, Natural Resources and Local Communities: Evidence from a Peruvian Gold Mine. http://www.sfu.ca/~faragons/files/mining.pdf
- W. Max Corden and J. Peter Neary, Booming Sector and De-Industrialisation in a Small Open Economy, The Economic Journal , Vol. 92, No. 368 (Dec., 1982), pp. 825-848. http://www.jstor.org/stable/2232670
- Oeindrila Dube and Juan Vargas, Commodity price shocks and civil conflict: evidence from Colombia. https://files.nyu.edu/od9/public/papers/Dube_commodities_conflict.pdf
- Mehlum, H., K. Moene and R. Torvik (2006), "Institutions and the Resource Curse", Economic Journal 116: 1-20. http://dx.doi.org/10.1111/j.1468-0297.2006.01045.x
- J. Peter Neary, Determinants of the Equilibrium Real Exchange Rate, The American Economic Review , Vol. 78, No. 1 (Mar., 1988), pp. 210-215 (http://www.jstor.org/stable/1814708)
- van der Ploeg, F. (2011), "Natural Resources: Curse or Blessing?" Journal of Economic Literature, 49(2): 366–420. http://dx.doi.org/10.1257/jel.49.2.366
- Frederick van der Ploeg and Steven Poelhekke, The pungent smell of "red herrings": Subsoil assets, rents, volatility and the resource curse, Journal of Environmental

Economics and Management, Volume 60, Issue 1, July 2010, Pages 44-55. http://dx.doi.org/10.1016/j.jeem.2010.03.003

- Steven Poelhekke and Frederick van der Ploeg, "Do natural resources attract non-resource FDI?", The Review of Economics and Statistics, forthcoming. http://www.oxcarre.ox.ac.uk/images/stories/papers/ResearchPapers/oxcarrerp201051.pdf
- Sachs, J.D and A.M. Warner (2001), "Natural Resources and Economic Development: The curse of natural resources", European Economic Review 45: 827--838. http://dx.doi.org/10.1016/S0014-2921(01)00125-8
- Pedro C. Vicente, Does oil corrupt? Evidence from a natural experiment in West Africa, Journal of Development Economics, Volume 92, Issue 1, May 2010, Pages 28-38. http://dx.doi.org/10.1016/j.jdeveco.2009.01.005
- Hunt Allcott and Daniel Keniston, Dutch Disease or Agglomeration? The Local Economic Effects of Natural Resource Booms in Modern America, mimeo. https://files.nyu.edu/ha32/public/research/Allcott_and_Keniston_Natural_Resource_Booms.pdf
- Brian R. Copeland & M. Scott Taylor, 2004. "Trade, Growth, and the Environment," Journal of Economic Literature, American Economic Association, vol. 42(1), pages 7-71, March.
- Copeland and Taylor, Trade and the Environment, Princeton University Press, 2003

Non-mandatory background reading:

- Edward B. Barbier, "Natural Resources and Economic Development," ISBN:9780521823135, 2005
- Paul Collier, "The Plundered Planet: How to Reconcile Prosperity With Nature," Allen Lane, 2010
- Paul Collier, "The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It," Penguin Press, 2008
- Frederick van der Ploeg, 2013. " Untapped Fossil Fuel and the Green Paradox: A Classroom Calibration of the Optimal Carbon Tax," OxCarre Working Papers 119, Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford. http://www.oxcarre.ox.ac.uk/files/OxCarreRP2013110.pdf
- Frederick van der Ploeg and Cees Withagen, 2013. "Global Warming and the Green Paradox," OxCarre Working Papers 116, Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.
- http://www.oxcarre.ox.ac.uk/files/OxCarreRP2013116.pdf
- Jeffrey D. Sachs, "Common Wealth: Economics for a Crowded Planet", Penguin Press, 2008

Course entrance requirements: Econometrics I, Microeconomics I, Macroeconomics I

Assessment: Two take home Assignments (30%), referee report on paper from a selected list (20%), written exam (3 hours; 50%, at least 5.0 required)

TI159 RISK AND RATIONALITY

Instructor: Prof. P.P. Wakker (EUR)

Short subject description:
A behavioral approach (using psychological insights to improve economics) to decision under risk and uncertainty (ambiguity); the rational and classical expected utility; descriptive and psychological, Nobel-awarded, prospect theory; modern ambiguity theories.

Course contents:
Risk and ambiguity are important in many decisions. They play a central role in insurance, game theory, health economics, business, finance, and many other fields. Psychologists have discovered irrationalities in human behavior, such as those underlying the equity premium puzzle. Kahneman and Tversky (1979) introduced prospect theory, which provides analytical tools for

integrating empirical psychological findings with economic models, and initiated the behavioral approach. Prospect theory provided a rational model of irrational behavior, something considered impossible up to then. An important advance was made in 1992, when the theory was extended to deal with ambiguity (unknown probabilities), which is the common case in economics and in our everyday decisions. Then the behavioral approach became mature.
In experiments in class, the risk attitudes of the participants will be measured, and the best-fitting model will be determined for each. Irrationalities will be discussed (anonymized), and financial advices will be given, based on theoretical foundations, such as: do not insure low-cost risks—e.g., bike-theft; (b) invest pension-savings in stocks and not in bonds. Whereas Micro IV touched upon the behavioral approach to many topics superficially, this course presents the approach in depth for risk and ambiguity.

Course objective:
Prescribe, predict, and describe decisions under risk and ambiguity. Analyze them theoretically, measure them empirically, apply them in the student's research interest, and improve private decisions. Learn about modern models of ambiguity and general behavioral principles—framing, nudge, paternalism, normative-descriptive discrepancy—relevant in many areas beyond risk: interpersonal decisions, intertemporal decisions, welfare, and others.

Literature:
Compulsory:

- Wakker, Peter P. (2010). *Prospect Theory: for Risk and Ambiguity*, Cambridge University Press, Cambridge (Paperback: ISBN-13:9780521748681; hardcover ISBN-13:9780521765015)

Recommended:

- Tversky & Kahneman (1981). *Science* 211, 453-458
- Tversky & Wakker (1995). *Econometrica* 63, 1255-1280
- Kahneman, Wakker, & Sarin (1997). *Quarterly Journal of Economics* 112, 375–405

Course entrance requirements:
Elementary probability calculus; quantitative aptitude.
Recommended (optional): Microeconomics I

Assessment: Oral exam (100%); 1 take-home assignment & presenting some homework exercises are required to get access to oral exam. Class-performance plays no role. Students can take course as a-student (empirically oriented; fits well with psychologists), c-student (theoretically oriented; fits well with mathematicians), or b-student (in between; fits well with economists).

TI134 SPATIAL ECONOMICS

Instructors: Prof. H.L.F. de Groot (VU), Prof. F. van der Ploeg (VU) and Prof. E.T. Verhoef (VU)

Short subject description:
This course focuses on the economic analysis of urban, regional, transport and environmental phenomena, including topics such as agglomeration, sorting and spatial interaction; equilibrium, competition and optima in physical transport network markets; and exhaustible resources and global warming.

Course contents:
This course covers advanced topics in theoretical and empirical research on spatial, environmental and transport economics. Key issues in the "spatial block" are location and potential reasons for clustering of economic activity, the role of geographic factors in explaining regional economic growth performance, urban size and growth, and the functioning of regional labor markets. Topics to be addressed in the "transport block" include market failures stemming from external effects and market power in dynamic network markets; and first-best and second-best regulation of such market failures. Finally, the "environmental block" will consider the optimal climate policies in the global economy, paying attention to the social cost of carbon, stranded assets, and renewable

subsidies, using an integrated assessment model of growth and climate damages with tipping points. The course seeks a balance between theory and empirics, between analytical methodologies and policy analysis, and aims to integrate applied microeconomics and spatial, transport and environmental science.

Literature:
Compulsory:
Brakman, S., J.H. Garretsen and C. van Marrewijk (2009). *The New Introduction to Geographical Economics*, Cambridge University Press, Cambridge
Combes, P.P., G. Duranton and L. Gobillon (2008). *Spatial Wage Disparities: Sorting Matters!*, Journal of Urban Economics, 63(2), pp. 723-742
Dietz, S. and N. Stern (2015). *Endogenous Growth, Convexity of Damages and Climate Risk: How Nordhaus' Framework Supports Deep Cuts in Carbon Emissions*, Economic Journal, 125(583), pp. 574-602
Gallup, J.L., J.D. Sachs and A.D. Mellinger (1999). *Geography and Economic Development*, International Regional Science Review, 22, pp. 179-232
Glaeser, E.L., H.D. Kallal, J.A. Scheinkman and A. Shleifer (1992). *Growth in Cities*, Journal of Political Economy, 100, pp. 1126-1151
Gollier, C. (2013). *Pricing the Planet's Future, The Economics of Discounting in an Uncertain World*, Princeton University Press, Princeton
Nordhaus, W. (2013). *The Climate Casino*, Yale University Press, New Haven
Ploeg, R. van der (2015). *Second-best Carbon Taxation* in the Global Economy: The Green Paradox and Carbon Leakage Revisited', Research Paper 157, OXCARRE, University of Oxford (download: oxcarrerp2015157.pdf)
Ploeg, R. van der and A.J. de Zeeuw (2015). *Climate Tipping and Economic Growth: Precautionary Saving and the Social Cost of Carbon*, Research Paper 118, OXCARRE, University of Oxford (download: oxcarrerp2013118.pdf)
Rezai, A. and R. van der Ploeg (2015). *Intergenerational Aversion, Growth and the Role of Damages: Occam's Rule for the Global Carbon Tax*, Research Paper 150, OXCARRE, University of Oxford (download: oxcarrerp2015150.pdf)
Small, K.A. and E.T. Verhoef (2007). *The Economics of Urban Transportation*, Routledge, London

Course entrance requirements: Microeconomics I, Macroeconomics I

Assessment: Sit-in written exam (3 hours; 80%, at least 5.0 required) and a written essay (20%).

TI160 THE MACROECONOMICS OF PENSIONS AND AGEING

Instructors: Prof. R.M.W.J. Beetsma (UvA) and Dr W. Romp (UvA)

Short subject description:
Driven by the ongoing ageing process, many countries (re)design their pension system. Changes in the roles of the public and private pension pillars and the government's tax-transfer system impact both the distribution of resources and the way risks are shared among groups (such as various generations or income classes). Redistribution involves predictable shifts in resources, while risk sharing refers to unanticipated changes in the distribution of resources. Redistribution and risk sharing implied by the pension system generate important feedback effects on the economy as a whole. In this course we will analyse the macroeconomic aspects of ageing and pension systems.

Course contents:
This course is offered as a reading group consisting of seven sessions. Each session two participants will each present one (or two) papers. This presentation should highlight the paper's scientific contribution, the research methodology and results. All participants are required to have read the papers before the session! Each participant will present twice in total, the first week will be prepared by Beetsma and Romp.

Course objective:
By the end of this course, students can identify the main causes and quantitative demographic effects of the ageing process in the Western World. They understand the pros and cons of various types of pension design and how these pension systems help to absorb and share ageing and financial shocks. Finally, they can use the various overlapping generations models to provide a formal qualitative analysis of the various transmission channels through which ageing and pensions affect the government budget constraint, economic performance and labour market performance.

Basic background reading:

- European Commission (2012). The 2012 Ageing Report: Economic and budgetary projections for the EU27 Member States (2010 - 2060), European Economy 2/2012. Chapters 1 and 2 (appr. 100 pages).
- Heijdra, B.J. (2009). Foundations of Modern Macroeconomics, Oxford University Press. Chapter 16 & 17.
- OECD (2005). Pensions at a Glance: Public Policies across OECD Countries, OECD Publishing. Part 1: Pension-system Typology.
- OECD (2012). OECD Pensions Outlook 2012, OECD Publishing. Chapters 1 and 2.
- United Nations (2013). World Population Prospects: The 2012 Revision Volume I, Comprehensive Table, Department of Economic and Social Affairs, Population Division. Only executive summary. Support info on http://esa.un.org/wpp/.

Provisional literature:

- Beetsma & Romp, Intergenerational Risk Sharing (forthcoming in Handbook of Economics of Population Ageing) downloadable from http://www.uva.nl/profile/w.e.romp
- Lindbeck, A. and M. Persson (2003). The Gains from Pension Reform, Journal of Economic Literature 41, 74 - 112.
- Andonov, A., Bauer, R., and Cremers, C. (2014). Pension Fund Asset Allocation and Liability Discount Rates. (Downloadable from http://www.aleksandarandonov.com/)
- Kisser, M., Kiff, J., and Soto, M. (2016). Do Pension Plans Exploit Regulatory Leeway to Manage Pension Liabilities?
  (Downloadable from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2506628)
- Rauh, J. and R. Novy - Marx (2011). Public Pension Promises: How Big Are They and What Are They Worth?, Journal of Finance 66(4), 1207 - 1245.
- Beetsma & Romp (2015). Participation Constraints in Pension Systems, mimeo. (latest version downloadable from http://www.uva.nl/profile/w.e.romp)
- Cooley, T.F. and J. Soares (1999). A Positive Theory of Social Security Based on Reputation, Journal of Political Economy, vol. 107, 1, 135 - 160.
- Tabellini, G. (2000). A Positive Theory of Social Security, Scandinavian Journal of Economics 102, 3, 523 - 545.
- Gonzales-Eiras, M. and Niepelt, D. (2008). The Future of Social Security, Journal of Monetary Economics, vol. 55, 197-218.

Entrance requirements:
Required: Microeconomics I and Macroeconomics I
Recommended (optional): Macroeconomics II

Assessment: The final grade is a weighted average of the participation (25%), the presentations (25%) and a take home test (50%).

TI176 TI ECONOMETRICS LECTURES 2018

Teacher: to be announced

Course description:
Annual PhD lectures organized by the Tinbergen Institute and the Econometric Institute at EUR, in

cooperation with Princeton University Press.
Further course details will be published on the TI website.

TI175 TI ECONOMICS LECTURES 2018

Teacher: Prof. E. Duflo (MIT)

Title: to be announced

Course description:
Details will be published on the TI website.

TI138 TOPICS IN ORGANIZATION AND MARKETS

Coordinators: Dr S. Onderstal (UvA) and Prof. O. Swank (EUR)

Instructors: Dr B. Crutzen (EUR), Dr J. Delfgaauw (EUR), Dr S. Kapoor (EUR), Dr S. Onderstal (UvA) and Dr M. Watanabe (VU)

Short subject description:
The course discusses topics from the research frontier in both Industrial Organization and Organizational Economics. The course aims at Tinbergen students at the end of their first year and that have to decide on their specialization major in the second year.

Course contents:
The course's aim is to discuss with students the process of development and execution of research ideas within the fields of Industrial Organization and Organizational Economics. In class, the teachers will discuss some of their own papers together with closely related papers. The emphasis will be on how the teachers developed the research ideas leading to the papers. This means that the teachers will focus less on the technical details, and more on the creative process in academia

Industrial Organization and Organizational Economics are both large fields. Rather than a broad overview, this course will discuss several topics in detail. This discussion will be representative for both the type of research questions that are addressed in these fields as well as for the methods of study (theoretical, empirical, and experimental).

To stimulate students to take part in the creative process, a substantial part of each lecture will be devoted to discuss the students' ideas for future research based on the papers discussed. For each lecture, students have to formulate an idea for a research project. Their ideas are discussed during the lecture. To facilitate the discussion, students have to send in a written version (about half a page) of the idea on the night before the lecture. Each idea will be discussed during the lecture; active participation of the other students is expected here.

Organization:
The course consists of two blocks; the first is taught at TIA, the second at TIR. The schedule of the course is as follows:

Week 1 (TIA): 2 x 2 hours lecture. Instructor: Sander Onderstal
Week 2 (TIA): 2 x 2 hours lecture. Instructor: Makoto Watanabe
Week 3 (TIA): research proposal writing, including personal feedback from instructors
Week 4 (TIA): presentations first research proposals
Week 5 (TIR): 2 x 3 hours lecture. Instructors: Josse Delfgaauw and Sasha Kapoor
Week 6 (TIR): 3 hours lecture. Instructor: Benoit Crutzen
Week 7 (TIR): research proposal writing, including feedback from instructors, plus presentations second research proposals

Note that we envisage learning-by-doing: the second research proposal should be written in a slightly shorter period than the first research proposal.

Literature:
The lectures are based on the following papers:

Week 1 (Industrial Organization) – Sander Onderstal

- Gomez-Martinez, F., S. Onderstal, and J. Sonnemans (2016). Firm-specific information and explicit collusion in experimental oligopolies. European Economic Review 82, 132-141.
- Hinloopen, J. and S. Onderstal (2014), Going once, going twice, reported! Cartel activity and the effectiveness of antitrust policies in experimental auctions. European Economic Review 70, 317-336.
- Normann, H.T. and R. Ricciuti (2009), "Laboratory experiments for economic policy making." Journal of Economic Surveys 23: 407-432.
- Onderstal, S., A.J.H.C. Schram, and A.R. Soetevent (2013), "Bidding to give in the field." Journal of Public Economics 105, 72-85.
- Vega-Redondo, F. (1997), "The evolution of Walrasian behavior." Econometrica, 65(2), 375-384.

Week 2 (Industrial Organization) – Makoto Watanabe

- Gautier, P., Hu, B., and M., Watanabe, (2016) Market-making middleman, mimeo
- Holzner, C., and M. ,Watanabe, (2016), Understanding the role of the Public Employment Agency, TI working paper
- Rust, J., and R., Hall. (2003), Middlemen versus Market Makers: A Theory of Competitive Exchange, Journal of Political Economy, 111 (2), 353-403.
- Watanabe, M. (2010), A Model of Merchants, Journal of Economic Theory, 145 (5), 1865-1889.
- Weyl, G. (2010), A Price Theory of Multi-Sided Platforms, American Economic Review, 100(4), 1642-1672.

Weeks 5 - 6 (Organizational Economics) – Benoit Crutzen, Josse Delfgaauw, and Sasha Kapoor

Lecture Josse Delfgaauw

- Besley, T. and Ghatak, M. (2005). Competition and incentives with motivated agents, American Economic Review, vol. 95(3), 616-636.
- Prendergast, C. (2007). The motivation and bias of bureaucrats, American Economic Review, vol. 97(1), 180-196.
- Delfgaauw, Josse, and Dur, Robert (2008), Incentives and workers' motivation in the public sector, Economic Journal, vol. 118(525), 171-191.

Lecture Sacha Kapoor

- Kapoor, Sacha (2011), "Incentive Provision in Multitask Jobs: Experimental Evidence from the Workplace." Working Paper.
- Kapoor, Sacha and Magesan, Arvind (2013), "Having it Easy: Consumer Discrimination and Specialization in the Workplace." Working Paper.
- Kapoor, Sacha, and Arvind Magesan (2014), "Paging Inspector Sands: The Costs of Public Information." American Economic Journal: Economic Policy 6(1): 92-113.
- Mas, Alexandre, and Enrico Moretti (2009), "Peers at Work." American Economic Review 99(1): 112-145.

Lecture Benoit Crutzen

- Konrad, K. (2009). Strategy and Dynamics in Contests (LSE Perspectives in Economic Analysis). Oxford University Press
- Sisak, D. (2009). Multiple Prize Contests – The optimal allocation of prizes. Journal of Economic Surveys
- Crutzen B and S. Flamand (2015). An analysis of intra-team prize allocation rules in multiple prize contests between teams. Work in progress, EUR and TI Rotterdam.

Assessment:
Participants have to write two short research proposals; one within the field of Industrial Organization, and another within the field of Organizational Economics. In the weeks following the lecture, each student chooses one of his/her previously formulated ideas and expands this into a research proposal of 5 – 10 pages (11 pt). The research proposal describes the relevance and novelty of the idea, places it in the literature, and presents a sound methodology to address the research question, derives or hints at probable results, and concludes with indications as to how to further develop it. The proposal should be feasible in the sense that it should be attainable in a reasonable amount of time, hence involving theoretical knowledge, data, or experiments that can realistically be learnt/gathered/conducted in a normal time-frame, e.g. as part of an MPhil thesis or a chapter of a PhD thesis. In the final sessions in Amsterdam and Rotterdam, all students present their research proposals.

The grades for the course depend on the developed research ideas (60% of the final grade), essay writing (20%) and quality of the presentations (20%).

TI146 TOPICS IN POLITICAL ECONOMY

Instructors: Dr B.S.Y. Crutzen (EUR) and Dr D Sisak (EUR)

Short subject description:
The course is made of 8 lectures. There is no final exam. Students have to propose a research idea.

The purpose of this course is, depending on the request of the (majority of) MPhil students enrolling on the course, to focus on either of the following two options:

- Offer an introduction to some of the classical models used in political economy, to study games of electoral or political competition, while leaving one lecture in the middle of the course and one at the end to brainstorm/discuss research ideas that students will submit for this course;
- Focus on the state of the art in the analysis of organizational politics and leadership in politics, while leaving one lecture in the middle of the course and one at the end to brainstorm/discuss research ideas that students will submit for this course;

Irrespective of the topics covered, the course is thus divided into two parts. The first part consists of 5/6 lectures and entails classes by the instructor(s). These classes are meant to be *interactive*: students are expected to have studied the papers to be presented beforehand so that during class a large faction of the available time will be devoted to discussing the paper(s), rather than merely going over them.
The second part of the course consists of two lectures in which students present their research idea (one in the middle and one at the end of the course).

Course contents:
The course is made of 8 lectures. There is no final exam. Students have to propose a research idea.

Option 1: Introduction to models of elections.
In the first five lectures, B. Crutzen will present a series of classical electoral games. In lecture 6, D. Sisak will cover a few models on information transmission games in elections (point 7 below). The final two lectures are devoted to the discussion of the research ideas of students
What follows is the somehow chronological order of the literature findings; this may not be the ordering followed in the course though; the depth with which we shall cover each of the models referred to below depends upon what other TI courses will have covered already.
1. The median voter theorem of Downs (1957),
2. The citizen candidate model of Wittman (1977), Osborne and Slivinsky (1996) and Besley and Coate (1997)
3. The probabilistic voting modeling strategy of Lindbeck and Weibull (1987)
4. The electoral competition models of Persson, Roland and Tabellini (1997, 2000), Persson and Tabellini (1999), Myerson (1999) and Crutzen (2015)

5. The electoral competition models of Schofield (2003, 2007), Serra (2011) and Crutzen and Flamand (2015)
6. The electoral competition models of Myerson (1993), Lizzeri and Persico (2001, 2005) and Crutzen and Sahuguet (2009)
7. Information transmission models of election as in Sisak and Denter (2015)

Option 2: An introductory course on Selection and Leadership within Primaries
The first 3 lectures will focus on selection within parties. Most papers in the first part of the course are theoretical ones, but there will be some room for empirical works too. We will discuss the effects of different candidate selection procedures generally, but will also focus on the American system of primaries (especially that used for the elections to the US House of Congress). The lecture immediately after this first part will be devoted to the discussion of student research ideas.
Papers/contributions we will cover in the first part of the course are:

1. Selection in 'general':
   Persson and Tabellini (2000, chapters 4 and 8); Caillaud and Tirole (2002); Crutzen (2015); Crutzen and Flamand (2015b); Galasso and Nannicini (2011, 2015); Hazan and Rahat (2010); and Shomer (2012)
2. Selection in the US via the 'American Direct Primary': Ware (2002); Ansolabehere, Hansen, Hirano and Snyder (2006, 2007); Castanheira, Crutzen and Sahuguet (2010); Snyder and Ting (2011); and Crutzen and Sahuguet (2015a and b)

Lectures 5-7 will focus on leadership and its effects. Papers we will review in this part include:
Hermalin (1998); Rotemberg and Saloner (2000); Dewan and Myatt (2007, 2008, 2012); Crutzen and Flamand (2015a and b); and Dewan and Squintani (2015)
The last lecture will again be devoted to the discussion of research ideas.

Course objectives:
Either to familiarize students with the most common models of elections in political economy -- if students select option 1 -- or to expose them to the state of the art in the modeling of selection and leadership in political economy.

Note: After the course students should be in a position to contribute to the literature in political economy by building on the material they will have covered.

Literature:
See the references above for the required readings. Detailed references are at the end of this document.

Warning: the final list of references will be circulated at the beginning of the course once the course option has been selected.

Course entrance requirements: MPhil first year courses

Assessment:
1/3: Each student is expected to participate actively in each class by having studied beforehand and by discussing the papers presented in class;
2/3: Develop a final paper idea, ideally (at least partially) worked out (10-15 pages; important ingredients are the related literature, the model; at least some partially worked out analysis; papers can be theoretical, empirical, experimental or a mixture of these).

References (suggestive only):

- Ansolabehere, Steven, John Mark Hansen, Shigeo Hirano and James M. Snyder Jr. (2006). "The Decline of Competition in U.S. Primary Elections, 1908-2004"
- Ansolabehere, Steven, John Mark Hansen, Shigeo Hirano and James M. Snyder Jr. (2007). "The incumbency advantage in U.S. primary elections". Electoral Studies 26: 660-668
- Besley, Timothy and Coate (1997). "An Economic Model of Representative Democracy." Quarterly Journal of Economics 112: 85-114
- Caillaud, Bernard and Tirole, Jean (2002). "Parties as Political Intermediaries" The Quarterly Journal of Economics 117: 1453-1489.

- Castanheira, Micael, Benoit S Y Crutzen and Nicolas Sahuguet (2010). “Party Organization and Electoral Competition” Journal of Law, Economics and Organization 26: 212-242.
- Crutzen, Benoit S. Y. (2015). “Keeping Politicians on Their Toes: Does the Candidate Selection Procedure Matter?" Mimeo, Erasmus School of Economics
- Crutzen, Benoit S. Y. and Sabine Flamand (2015a).”United we (Need to) Stand." Mimeo, Erasmus School of Economics
- Crutzen, Benoit S. Y. and Sabine Flamand (2015b). “An Analysis of Multi-Prize Contests across Teams”
- Crutzen, Benoit S. Y. and Nicolas Sahuguet (2009). “Redistributive Politics with Distortionary Taxation.” Journal of Economic Theory 144: 264-279
- Crutzen, Benoit S. Y. and Nicolas Sahuguet (2015). “In Defence of Uncontested Primaries with Incumbents.” Mimeo, Erasmus School of Economics
- Denter, Philipp and Dana Sisak (2015). “Do Polls Create Momentum in Political Competition ?” Mimeo, EUR
- Dewan, Torun and David P. Myatt (2007). “Leading the Party: Coordination, Direction, and Communication.” American Political Science Review 101: 827-845
- Dewan, Torun and David P. Myatt (2008). “The Qualities of Leadership: Direction, Communication, and Obfuscation.” American Political Science Review 102: 351-368
- Dewan, Torun and David P. Myatt (2012). “XXX". Journal of Theoretical Politics
- Dewan, Torun and Francesco Squintani (2015). “On Good Leaders and Their Associates.” mimeo, London School of Economics and Political Science
- Downs, Anthony (1957). “An Economic Theory of Political Action in a Democracy.” Journal of Political Economy 65: 135-150
- Galasso, Vincenzo and Tommaso Nannicini (2011). “Competing on Good Politicians". American Political Science Review 105
- Galasso, Vincenzo and Tommaso Nannicini (2015). “So Closed: Political Selection under Proportional representation.” Mimeo, Bocconi University
- Hazan, Reuven Y. and Gideon Rahat. 2010. Democracy within Parties: Candidate Selection Methods and their Political Consequences. Oxford University Press.
- Hermalin, B. (1998). “Toward an Economic Theory of Leadership: Leading by Example.” American Economic Review 88: 1188-1206
- Lindbeck, Assar and Jurgen Weibull (1987). “Balanced-Budget Redistribution as the Outcome of Political Competition.” Public Choice 52: 273-297
- Lizzeri, Alessandro and Nicola Persico (2001). “The Provision of Public Goods Under Alternative Electoral Incentives.” The American Economic Review
- Lizzeri, Alessandro and Nicola Persico (2005). “A Drawback of Electoral Competition.” Journal of the European Economic Association
- Myerson, Roger (1993). “Incentives to Cultivate Favored Minorities Under Alternative Electoral Systems.” American Political Science Review 87
- Osborne, Martin and Slivinsky (1996). “A Model of Political Competition with Citizen-parties.” Quarterly Journal of Economics 111: 65-96.
- Persson, Torsten, Gerard Roland and Guido Tabellini (1997). “Separation of Powers and Political Accountability.” The Quarterly Journal of Economics 112: 1163-1202
- Persson, Torsten, Gerard Roland and Guido Tabellini (2000). ``Comparative Politics and Public Finance.” Journal of Political Economy 108: 1121-1161
- Persson, Torsten and Guido Tabellini (1999). “The size and scope of government: Comparative politics with rational Politicians.” Alfred Marshall Lecture. European Economic review 43: 699-735.
- Persson, Torsten and Guido Tabellini (2000). Political Economics: Explaining Economic Policy. The MIT Press.
- Polborn, Matias and Stefan Krasa (201X). “”
- Rotemberg, Julio J. and Garth Saloner (2000). “Visionaries, Managers and Strategic Direction.” Rand Journal of Economics 31:693-714
- Schofield, Norman (2003). “Valence Competition in the Stochastic Spatial Model.” Journal of Theoretical Politics 15: 371-383
- Schofield, Norman (2007). “The Mean Voter Theorem: Necessary and Sufficient Conditions for Convergent Equilibrium.” The Review of Economic Studies 74: 965?80

- Serra, Giles (2011). “Polarization of What? A Model of Elections with Endogenous Valence.” The Journal of Politics 72:426-437
- Shomer, Yael (2012). “What affects candidate selection processes? A cross-national examination.” Party Politics
- Snyder, James M. Jr and Michael Ting (2011). “Electoral Selection with Parties and Primaries.” American Journal of Political Science 55: 781-795.
- Ware, Allan (2002). The American Direct Primary. Oxford University Press
- Wittman (1977). “Candidates with policy preferences: A dynamic model.” Journal of Economic Theory 14: 180-189

TI139 URBAN AND TRANSPORT ECONOMICS

Instructors: Prof. van Ommeren (VU) and Prof. J. Rouwendal (VU)

Short subject description:
This course aims to explain economic behaviour of households and firms within a spatial setting, where the roles of transport cost and cities come to the fore.

Course contents:
We introduce and apply the key concept of spatial equilibrium, where distance between agents, i.e. transport costs, play a fundamental role in their behaviour (location choice, labour supply, productivity). For example, we explain the role of agglomeration, the role of residential amenities, and the value of time of travel. Conceptual theoretical models are introduced and examined which are the basis for empirical work and are used as a guidance for welfare and policy analysis. Theoretical concepts are backed up with empirical studies.
Travel costs (notably the value of time) are key for understanding the spatial equilibrium of workers and firms within the city. In the transport lectures we discuss the dominant empirical approaches to estimate this value (including discrete choice analysis). We also pay attention to the impact of transport infrastructure on urban development.
Social interaction within cities and neighborhood effects as well as urban policy will receive due attention. We will, for instance, discuss the welfare impacts of place-based policies.
The course schedule will be as follows:

1. Introduction: Equilibrium within cities (including the monocentric model)
2. Equilibrium across cities (Roback model)
3. Agglomeration economies
4. Urban transport economics I (value of time, reliability)
5. Urban transport economics II (urban road and public transport infrastructure)
6. Urban distress (crime, neighborhood effects)
7. Cities and public policy

This follows the chapters in Glaeser,E (2008)

Course objective:
After the course students are able to understand the role of transport costs on location behaviour of firms and households within cities as well as across cities (and reversely) and why firms and households agglomerate. They have become familiar with the dominant conceptual models and empirical approaches within the transport and urban economic literature.

Literature:
Compulsory:

- Glaeser, E (2008). *Cities, Agglomeration and Spatial Equilibrium*, Oxford University press
- N. Baum-Snow (2007). *Did highways cause suburbanization?* Quarterly Journal of Economics
- K. Small (2008). *Urban transportation policy: A guide and a road map,* book chapter
- D. Schroeder (2010). *Discrete choice models,* book chapter

Course entrance requirements: Microeconomics I, Mathematics I, Statistics and Econometrics I

Assessment: Sit-in written exam (3 hours; 80%) and oral presentation (20%).

Appendix I Taking single courses

1. External participants in MPhil courses

Under certain conditions and subject to approval by the Director of Graduate Studies, individuals not affiliated to one of the TI partners (see below) are allowed to attend MPhil courses. External participants pay € 1,500 for a core course (one block of 8 weeks including one exam week) and € 1,250 for a field course (one block of 8 weeks including one exam week).

Prospective external participants should register for courses using the online course registration form on TI's website (http://www.tinbergen.nl/external-participants-in-mphil-courses/registration-form-for-external-students/) and follow further instructions given there. External applicants will only be admitted if they meet some equivalent of the TI course entrance criteria. Capacity restrictions apply to all courses, and are particularly relevant for core courses. To ensure course availability, external applicants should register for MPhil courses as early as possible, but ultimately two weeks before the start of the block in which the course takes place.

External participants who would like to withdraw from courses should notify Carine Horbach by email (courses@tinbergen.nl) no later than Sunday after the first lecture (all TI courses except intensive field courses) or the day of the first lecture (intensive TI field courses, marked with "*" in Section 3.4.1, only). Fees will be charged in case of late withdrawal.

2. Participants affiliated to a TI partner

PhD and research master's[5] students affiliated to one of the partners of Tinbergen Institute are allowed to attend courses from TI's MPhil program. TI partners are: FEWEB (VU University), FEB (University of Amsterdam), ESE (Erasmus University) and RSM (Erasmus University). Students can participate in all courses for which they meet the entrance requirements, subject to capacity constraints. Fees (€ 1.000 per course) are charged to the faculty.

Course registration can be done by means of the online registration form for PhD students (http://www.tinbergen.nl/online-registration-form-phd-students/).
Students who would like to withdraw from courses should notify Carine Horbach by email (courses@tinbergen.nl) no later than Sunday after the first lecture (all TI courses except intensive field courses) or the day of the first lecture (intensive TI field courses, marked with "*" in Section 3.4.1, only). Fees will be charged in case of late withdrawal.

3. MPhil graduates

PhD students who completed the TI MPhil program are most welcome to participate in additional field courses during the later years of their studies at the institute. MPhil graduates should register for courses using the online registration form on TI's website (http://www.tinbergen.nl/online-registration-form-phd-students/).
No fees will be charged for PhD students who have transferred from the MPhil program.

[5] Research master's students: students registered for the research master's program Business in Society (UvA or VU) or the ERIM research master's in Business and Management.

Appendix II Tinbergen Institute PhD students and the TI Research Qualification

Tinbergen Institute offers a special educational program for 4-year PhD students who entered the PhD track with only a one year MSc degree. Tinbergen Institute awards the TI Research Qualification to PhD students who complete this special program. The requirements of the program are given below. The TI Research Qualification is a condition for access to additional facilities provided by TI e.g. support on the job market in the final phase of the PhD period including an additional budget to participate in international job market activities.

Students who have completed TI's MPhil program and students who have completed another, comparable high level research master's program (to be assessed by the Director of Graduate Studies) already fulfill TI's educational requirement and have access to the same additional facilities as students with the TI Research Qualification.

Four educational paths

Four educational paths lead to the TI Research Qualification. The objective of offering four different paths is to give individual PhD students the opportunity to participate in a limited program of PhD courses that is tailor-made to their needs and educational background, while maintaining some of the key characteristics of the full-fledged MPhil program:

- have an understanding of the core of economics by taking rigorous and common training in one or more of the core subjects and tools of economics,
- have a sufficiently deep understanding of one field of economic research by choosing a major field in which at least 4 field courses are taken.

One of the following paths (I-IV) may be chosen, depending on the student's background and interest:

Path	Core Requirement	ECTS	Field requirement	ECTS		ECTS	TOTAL ECTS
I	Econometrics or Advanced Econometrics	20	at least 4 courses in a chosen major field	12	3 other field courses or 2 additional core courses	8-9	40-41
II	Microeconomics, Macroeconomics or Finance	16	at least 4 courses in a chosen major field	12	4 other field courses or 3 additional core courses	12	40
III	2 core sequences	32-36	at least 4 courses in a chosen major field	12			44-48
IV	3 core courses*	12	at least 4 courses in a chosen major field	12	7 other field courses	21	45

* one or more of these core courses may be replaced by field courses

PhD students, who wish to receive rigorous training in the core of microeconomics, macroeconomics, econometrics or finance, choose either path I or II. Students who start their PhD without a firm background in economics may decide to focus their educational program at TI even more at the core principles by choosing path III. Compared to the other paths, this path gives more opportunities to catch-up, which is reflected in the somewhat higher number of ECTS involved.

Students with a firm background in economics may decide to start immediately with taking specialized courses. Path IV is the path catered to the interests of these students. To deviate from one of the paths, students need official and written consent of the Examination Board.

At the end of the first full academic year after they were appointed as a PhD student, students need to have fulfilled at least 24 ECTS of their chosen path. 32 months after the start of their PhD, students should have fulfilled all educational requirements of their chosen path. Core or field courses are never exempted for PhD students who wish to qualify for the TI research qualification by taking one of the educational paths.

The DGS assesses whether the student meets the entrance requirements for the field courses. The Annual Study Guide stipulates the fields in which the field courses have been classified. Courses within one field count towards the field requirement. Students who have fulfilled the field requirement may take a single core course block which was not part of their core requirement, to replace a single field course. The number of credits awarded for a core course block is then 3 ECTS. Students have the option to substitute a field course which forms part of the field requirement for a field paper (3 ECTS). The paper should be connected to one of the taken field courses and is supervised by the teacher of that course.

With the official written consent of the Examination Board, students may substitute TI field courses for PhD level courses organized by other graduate schools or by inter-university networks. The number of ECTS as determined by the school offering the course applies.

Students can pass core courses consisting of 4 or 5 blocks and obtain all ECTS for this core course either by passing all course blocks within this course with a grade 6 or higher, or by obtaining a grade 5 for one course block in the course, a grade 7.5 or up for one other course block in the course, and a grade 6 or up for the remaining course blocks in the course. A 4 or lower for one course block and/or a 5 for more than one course block in the course cannot be compensated and mean that the student did not pass the course. This compensation rule does not apply if students follow a selection of course blocks instead of the complete core course. The compensation rule applies across academic years.

For detailed information on the educational requirement, we refer to the **Academic and Examination Regulations for the TI Research Qualification** on the Intranet.

How to proceed

At the start of the PhD track, the student selects in consultation with his/her supervisor one of the educational paths described above and selects courses accordingly. The TI Director of Graduate Studies (DGS) or the ESE DGS (for EUR students) and the supervisor need to give approval to the selected course package. The DGS will decide if a student meets the entrance requirements for the selected courses. The path and course package chosen are explicitly stated in the Plan for PhD training and guidance which forms part of the PhD student's employment contract. PhD students should register for TI courses in the usual way, so by means of the online registration form (http://www.tinbergen.nl/online-registration-form-phd-students/).
Price for each course is € 1.000.

Appendix III Teaching associates 2017/2018

Dr A. Andonov (EUR)	andonov@ese.eur.nl
Prof. R.E. Backhouse (Birmingham)	reb@bhouse.org.uk
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Professor Esther Duflo (Massachusetts Institute of Technology).

Tinbergen Institute Econometrics Lectures 2018:

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