| Syllabus Major 220 : Track SBSPH | |
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| **Module 220** | **Decision analysis in Public Health** |
| **Module Coordinator** | Simon Combes, PhD<br>Lecturer in Health Economics, Ehesp, simon.combes@ehesp.fr |
| **Dates** | From November 30 to December 4, 2020 |
| **Crédits/ECTS** | 3 (1 ECTS = 25h student's work) |
| **Duration** | Number of days: 5  (Number of hours (in-class and outside of class):  75 |
| **Module description** | Countries have come under increasing pressure to deliver healthcare with greater efficiency in order to reduce costs and respect quality standards. Taking into account the complexities that countries face when making choices of incorporating new medicines and medical devices, Health Technology Assessment (HTA) is receiving growing attention from governments, industry and patients, including in emerging countries. HTA can inform health policy-makers and their decision-making processes concerning the incorporation of health technologies into the healthcare system.<br><br>This course aims at presenting how economic evaluation and decision modeling can be used for decision making in the health care system. Students will learn how to build a Markov model in order to generate data to implement cost-effectiveness analysis. Sensitivity analysis, meant to test robustness of the generated results, will be also presented.<br><br>The course will use a combination of didactic and applied techniques to teach knowledge and skills relevant to the methods studied. The general format entails didactic sessions followed by lab computer exercises with Excel and R during which students are given the opportunity to gain a more concrete appreciation of the underlying concepts.<br><br>For some students, this course may be their first exposure to decision modelling for economic evaluation, while other students may use this course as an advanced course that provides more detailed knowledge on economic evaluation studied among other evaluation methods of public health programs in Minor 208. |
| **Prerequisites** | Basic statistical methods and economic evaluation methods;<br>Good command in Excel and R |
| **Course Learning Objectives** | Through lectures, hands-on computer lab exercises, readings, discussions, and course projects participants will be able to:<br>1. Interpret and use cost – effectiveness analysis methods.<br>2. Demonstrate the ability to critically appraise and interpret decision and cost-effectiveness analyses (CEA) published in the literature or used by National Health Technology Assessment (HTA) agencies worldwide.<br>3. Apply the knowledge of probability theory, and explain the value of diagnostic tests with regards to their ability to discriminate between patients with and without disease, and describe how the test characteristics of diagnostic tests are used to develop receiver operator characteristic (ROC) curves<br>4. Demonstrate knowledge of the symbolic notation used to develop decision simple decision tree models.<br>5. Apply knowledge of decision analysis fundamentals to develop decision analytic models capturing diagnostic and/or treatment issues in clinical medicine or within, public health prevention programs.<br>6. Build Markov Models for CEA and interpret main findings.<br>7. Demonstrate ability to deal with uncertainty in decision model with analytic responses and Probabilistic sensitivity analysis (PSA) and present results. |
| **UE Structure** | Session 1: Measuring and valuing health outcomes, P Chauvin 2H<br>Session 2: Fundamentals of Cost Effectiveness Analysis (CEA), P Chauvin 4,5H<br>Session 3: Transition probabilities, Test Characteristics and introduction to Receiver operator characteristic (ROC) Analysis, Simon Combes<br>Session 4: Decision analytic modelling (1) : decision tree models, S Combes, 3,5H<br>Sessions 5: Decision analytic modelling (2) : Markov models, S Combes 4,5H<br>Session 6: Dealing with uncertainty (1): Deterministic Sensitivity Analysis, S Combes 3H<br>Session 7: Workshop (1): students' project Building a Markov CEA Model S Combes 3H<br>Session 8: Dealing with uncertainty (2): Probabilistic Sensitivity. S Combes 5H<br>Session 9: Workshop (2): students' project Building a Markov CEA Model S Combes 6,5H<br><br>Sessions are detailed below |
| **Course requirement** | Students are expected to attend all lectures and seminars. Class attendance will be checked accordingly.<br>Being familiarized with the materials before lectures and workshops is highly encouraged. Students are also encouraged to continue working on laboratory/workshop exercises at home.<br>By pair collaboration during the workshop sessions is highly encouraged. Readings and other course materials are available electronically on the website and should be read as each unit is covered. |

| Grading and assessment | ≠ | Assignment topic | % | Type |
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| | 1 | First Assignment 'Monday) | 10% | Individual |
| | 2 | Second Assignment (Wednesday) | 20% | Individual |
| | 3 | Impact Evaluation (Friday) | 35% | Group work |
| | 4 | Final test (close book exam) end of January | 35% | Individual |

| Location | EHESP 20 Avenue George Sand 93 210 La Plaine Saint Denis (Greater Paris) |
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| Readings | Briggs A, Claxton K & Sculpher M. Decision Modelling for Health Economic Evaluation (2011, 2d Edition) Oxford University Press |
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| | Drummond, M. F., Sculpher, M. J., Torrance, G. W., O'Brien, B. J., and Stoddart, G. L. (2015). Methods for the economic evaluation of health care programmes. Fourth edition. Oxford: Oxford University Press. |
| | Gray AM, Clarke PM, Wolstheholme JL Wordsworth S. (2012). Applied Methods of Cost-Effectiveness Analysis in Health Care. Oxford University. 2d Edition. |
| | *See additional references P Chauvin and Z Zafari* |

**Course policy**

**Attendance & punctuality**
**Regular and punctual class attendance is a prerequisite for receiving credit in a course.** Students are expected to attend each class. Attendance will be taken at each class.
The obligations of attendance and punctuality cover every aspect of the course: - lectures, conferences, group projects, assessments, examinations, as described in EHESP Academic Regulations http://mph.ehesp.fr EHESP Academic Regulation Article. 3).
If students are not able to make it to class, they are required to send an email to the instructor and to the MPH program coordinating team explaining their absence prior to the scheduled class date. All supporting documents are provided to the end-of-year panel.
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Students who miss class are responsible for content. Any student who misses a class has the responsibility for obtaining copies of notes, handouts and assignments. If additional assistance is still necessary, an appointment should be scheduled with the instructor. Class time is not to be used to go over material with students who have missed class.

**Lateness**: Students who are more than 10 minutes late may be denied access to a class. Repeated late arrivals may be counted as absences (See http://mph.ehesp.fr EHESP Academic Regulation Article. 3 Attendance & Punctuality)

**Maximum absences authorized & penalty otherwise**
Above 20% of absences will be designated a fail for a given class. The students will be entitled to be reassessed in any failed component(s). If they undertake a reassessment or they retake a module this means that they cannot normally obtain more than the minimum pass mark (i.e. 10 out of 20)

**Exceptional circumstances**
Absence from any examination or test, or late submission of assignments due to illness, psychological problems, or exceptional personal reasons must be justified; otherwise, students will be penalized, as above mentioned. Students must directly notify their professor or the MPH academic secretariat before the exam or before the assignment deadline. Before accepting the student's justification, the professor or the MPH academic secretariat has the right to request either a certificate from the attending physician or from a psychologist, or from any other relevant person (See http://mph.ehesp.fr EHESP Academic Regulation Article 4 Examinations).

**Courtesy**: All cell phones/pages MUST be turned off during class time.
Students are required to conduct themselves according to professional standards, eating during class time is not permitted during class time, such as course or group work.

**Valuing diversity**

Diversity enriches learning. It requires an atmosphere of inclusion and tolerance, which oftentimes challenges our own closely-held ideas, as well as our personal comfort zones. The results, however, create a sense of community and promote excellence in the learning environment. This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity. Diversity includes consideration of: (1) life experiences, including type, variety, uniqueness, duration, personal values, political viewpoints, and intensity; and (2) factors related to "diversity of presence," including, among others, age, economic circumstances, ethnic identification, family educational attainment, disability, gender, geographic origin, maturity, race, religion, sexual orientation and social position.

**Evaluation**

EHESP requests that you complete a course evaluation at the end of the school year. Your responses will be anonymous, with feedback provided in the aggregate. Open-ended comments will be shared with instructors, but not identified with individual students. Your participation in course evaluation is an expectation, since providing constructive feedback is a professional obligation. Feedback is critical, moreover, to improving the quality of our courses, as well as for instructor assessment.

| Session 1 | **Measuring and valuing health outcomes** |
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| **Speakers** | P. Chauvin |
| **Learning Objectives** | *At the end of the session, the students should be able to:*<br>- Know how to compute utility score and QALYs<br>- Use EQ-5D questionnaire |
| **Duration** | 2 hours |
| **Training methods** | Lecture and workshop |
| **Readings** | Required Reading<br>Gray AM, Clarke PM, Wolstheholme JL Wordsworth S. (2012) Applied Methods of Cost-Effectiveness Analysis in Health Care. Chapter 5 Measuring, valuing, and analyzing health outcomes. Oxford University. 2d Edition. |

| Session 2 | **Fundamentals of Cost Effectiveness Analysis (CEA)** |
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| **Speaker** | P. Chauvin |
| **Learning Objectives** | *At the end of the session, the students should be able to:*<br>- Draw the Cost-effectiveness frontier<br>- Compute Incremental Cost-Effectiveness Ratio (ICER) and Incremental Net Benefit (INB)<br>- Formulate resource recommendations from these analytical tools |
| **Duration** | 4 hours |
| **Training methods** | Lecture and workshop |
| **Assignments** | Individual work : Assignment to be posted on Real<br>10% of final grade |
| **Readings** | Required Reading<br>Gray AM, Clarke PM, Wolstheholme JL Wordsworth S. (2012) Applied Methods of Cost-Effectiveness Analysis in Health Care. Chapter 2 Economic Evaluation in Health Care. Oxford University. 2d Edition. |

| Session 3 | **Transition probabilities,** |
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| **Speaker** | Simon combes, |
| **Learning Objectives** | *At the end of the session, the students should be able to:*<br>- Compute transition probabilities |
| **Duration** | 2 hours |
| **Training methods** | Lecture |
| **Readings** | Required Reading<br>• Briggs A, Claxton K & Sculpher M. Decision Modelling for Health Economic Evaluation (2011, 2d Edition) Oxford University PressDrummond, M. F., Sculpher, M. J., Torrance, G. W., O'Brien, B. J., and Stoddart, G. L. (2015). Chapter 8: Using clinical studies as a vehicle for economic evaluation. Fourth edition. Oxford: Oxford University Press. |

| Session 4 | **Decision analytic modelling (1) Decision Tree Cost Effectiveness Model** |
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| **Speaker** | Simon Combes |
| **Learning Objectives** | *At the end of the session, the students should be able to:*<br>- Choose the correct modeling approach<br>- Construct a decision tree by hand and in Excel |
| **Duration** | 3.5 hours |
| **Training methods** | Lecture and workshop |

| Readings | Required Reading<br>• Drummond, M. F., Sculpher, M. J., Torrance, G. W., O'Brien, B. J., and Stoddart, G. L. (2015). Chapter 9: Economic evaluation using decision analytic modeling. Fourth edition. Oxford: Oxford University Press. |
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| Session 5 | Decision analytic modelling (2) Markov Models |
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| Speaker | Simon Combes |
| Learning Objectives | *At the end of the session, the students should be able to:*<br>- Design a Markov model<br>- Create Markov traces<br>- Build a Markov model in Excel |
| Duration | 4.5 hours |
| Training methods | Lecture and workshop |
| Readings | Required Reading<br>• Sonnenberg FA, Berc JR. Markov models in medical decision making: a practical guide. Med Decis Making. 1993 Oct-Dec;13(4):322-38.<br>• Briggs A, Claxton K & Sculpher M. Decision Modelling for Health Economic Evaluation (2011, 2d Edition) Oxford University Press |

| Session 6 | Dealing with uncertainty (1) Deterministic Sensitivity Analysis |
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| Speaker | Simon Combes |
| Learning Objectives | *At the end of the session, the students should be able to:*<br>- Understand the sources of uncertainty<br>- Know how uncertainty is handled varies across studies<br>- Implement Deterministic Sensitivity Analysis (DSA) |
| Duration | 3 hours |
| Training methods | Lecture and workshop |
| Readings | Required Reading<br>• Briggs AH. Handling uncertainty in cost-effectiveness models. Pharmacoeconomics. 2000 May;17(5):479-500. |

| Session 7 | Workshop: students' project Building a Markov CEA Model |
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| Speakers | Simon Combes |
| Session Outline | - Build a Markov model from scratch<br>- Run it to provide cost and effectiveness estimations<br>- Draw the Cost-effectiveness frontier<br>- Formulate resource recommendations from Incremental Cost-Effectiveness Ratio (ICER) and Incremental Net Benefit (INB)<br>- Provide deterministic sensitivity analyses |
| Duration | 3 Hours |
| Training methods | Individual work |
| Assignments | Assignment to be posted on Real on December 13 2017<br>20% of final grade |

| Session 8 | Dealing with uncertainty (2) Probabilistic Sensitivity Analysis |
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| Speakers | Simon Combes |
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| Learning Objectives | *At the end of the session, the students should be able to:*<br>- Carry out a Probabilistic Sensitivity Analysis (PSA)<br>- Build acceptability curves<br>- Provide resource recommendations from the PSA results |
| Duration | 5 hours |
| Training methods | Lecture and workshop |
| Readings | <u>Required Reading</u><br>• Gray AM, Clarke PM, Wolstheholme JL Wordsworth S. (2012) Applied Methods of Cost-Effectiveness Analysis in Health Care. Chapter 10 Representing uncertainty in decision analysis models. Oxford University. 2d Edition.<br>• Gray AM, Clarke PM, Wolstheholme JL Wordsworth S. (2012) Applied Methods of Cost-Effectiveness Analysis in Health Care. Chapter 11 Presenting cost-effectiveness results. Oxford University. 2d Edition. |

| Session 9 | Workshop: students' project Building a Markov CEA Model |
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| Speakers | Simon Combes |
| Session Outline | - Run a Markov model to compute cost and effectiveness estimations<br>- Draw the Cost-effectiveness frontier<br>- Formulate resource recommendations from ICER and INB<br>- Run deterministic sensitivity analyses and a PSA<br>- Conclude from base case analysis and the sensitivity analyses |
| Duration | 6,5 Hours |
| Training methods | Group work |
| Assignments | Group work: 2 persons<br>Assignment to be posted on Real on December 20 2020<br>20% of final grade |