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European Maturity Model for Blended Education

Selection of blended learning activities and their sequence

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Modern War and Philosophy

Description

The course consists of a MOOC combined with face-to-face on-campus course. In the MOOC students are introduced to different philosophical reactions to the first world war through discussion and analysis of texts, documents, images, artworks, film and music. In class the students reflect on the material and discussions in the MOOC. The in-class students brought topics that were discussed in class back into the discussions in the MOOC.

Objectives

After successfully completing the MOOC student learns:

- Basic knowledge of important philosophical reactions to the first world war;
- Conceptual understanding of philosophical and literary texts;
- Historical understanding of the war and its cultural impact;
- A clearer grasp of the complex ways in which philosophy and the great war intersected.

Structuring

The physical classroom activities are intertwined with the online activities:

- Three hour lecture per week – consulting MOOC for readings
- MOOC lectures – discussions in the MOOC – physical discussion

Tools

MOOC on EDX platform:
https://www.edx.org/course/great-war-modern-philosophy-kuleuvenx-graphx-0

The MOOC consists of texts, video, discussion assignments and peer-to-peer assignments.

This is complemented by recordings of the in-class lectures (both for the enrolled face-to-face students and for other MOOC participants):
https://www.youtube.com/watch?v=Um4iqbi-Nc8&list=PLIuIRSariuij_EiYvlpEt8N61Z1S021gA

Face-to-face sessions: Lecture and discussion about what is happening in the MOOC (material, discussions, etc.)

Transition

The course used to be a traditional course (face-to-face lectures). In 2014 the university's policy makers were looking for MOOC pilots. They launched a call for proposals. The course was then submitted and chosen. The course designer received a budget to develop the MOOC. In the academic year 2015-2016 the MOOC was introduced in the course.

Architecture and Modelling of Management Information Systems

Description

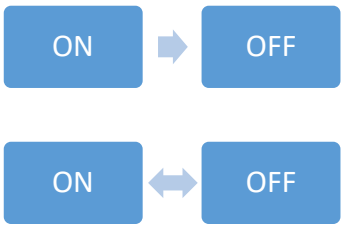
The goal of this course is to familiarize the students with modern methods and techniques of software engineering for Business Information Systems, to let them understand the relation between an information system and the organizational aspects of an enterprise, and to let them acquire sufficient skills to enable them developing an enterprise model as basis of a business information systems

Objectives

Upon completion of this course, the student:

- understands the role of RE in the software development process
- is capable of organizing requirements in a layered architecture
- is capable of performing a requirements analysis to create an enterprise model
- is able to evaluate alternative enterprise models against their impact on the (work) organization and their impact on information system services
- is able to create a high level view of information system services
- is able to relate the enterprise model and the information system services to a business process model.
- knows about modern software development techniques to transform analysis models into working code.

Structuring



As well as being structured as a duplication (in casu face-to-face lectures are recorded and made available as web lectures). The course can also be seen as an example of flipping the classroom where the online activities precede the physical classroom activities.

Tools

Recordings of the in-class lectures are available online (Youtube), use of Videolab and a MOOC on EdX that precedes the course. Students without the necessary prior knowledge can, in preparation of the course start of by following this MOOC.
https://www.edx.org/course/uml-class-diagrams-software-engineering-kuleuvenx-umlx-1

Half of the course is online – students make exercises in an online environment (JMermaid). It's a tool where students can draw a plan for an enterprise information systems according to user requirements. Then students can generate code according to the drawn plans and can as such immediate see the result of their modeling. The tool generates automatically feedback to students.

Face-to-face sessions: Theoretical sessions
Lab sessions: Practical assignments in a computer lab

Transition

This course represent the ongoing process of reflection of the teacher on her teaching. Students were facing difficulties in making the exercises, because they weren't able to 'see' what they had designed. In 2005 the course designer started with the development of a tool that 1) would include feedback on the quality of the created models and 2) could simulate the work of the students by generating code, so they could actually see what they had designed. Since 2011 the tool also generates feedback in the generated code in an automatic way, thereby improving a student's interpretation of the simulation and stimulating reflection on the cause-effect link between the drawn model and the application's behavior.

The tool also logs the student's modeling process, and these processes have been analyzed by means of process mining techniques for discovering modeling patterns associated to good and bad model quality.

As an added step to this continuing process the course designer started a SPOC (containing the web lectures) as a step up to a MOOC.

Teaching Methodology: Behavioral Sciences and Education

Description

This course is taught university-wide as well in behavioral sciences as in sciences. The contents of the course is grouped into different themes. In each theme a translation is made from the general theory to the broad domain of behavioral sciences and education.

- The teacher in behavioral sciences
- The teacher as organizer and coach of teaching and learning processes
- The teacher in relation to his/her students
- The teacher as evaluator of teaching and learning processes
- The professional development as teacher in behavioral sciences

Objectives

After successfully completing the course the student learns to:

- show insight into the relevant frameworks of reference about learning and teaching in the fields of psychology, educational sciences and other related domains.
- demonstrate knowledge of the reflective experiential learning as a didactic framework forming the basis of the practical training in the teacher training behavioral sciences.
- reflect critically upon the basic principles and significance of specific didactical practices in education in behavioral sciences.

Structuring

The course starts off with an introductory face-to-face lecture and ends with a face-to-face round up session. In between these lectures, activities (comprised of individual and group assignments) are online. These activities are supported by as well face-to-face individual and group feedback sessions as feedback via skype.

Tools

Online learning environment in university LMS: knowledge and skills students need in order to make the assignment. combination of video, presentations, articles, FAQ, discussion forum, group blog

Course text (this is the core of the study material)
Face-to-face sessions: Introductory lecture and round up lecture. Individual and group feedback to monitor the learning process

Transition

This course started as the first distance education course at the university, where students were expected to independently process the course material. Three years ago the didactic team decided to redesign the course towards a blended approach, because of the scaling up in the multi campus context of the development of the educational master. The student numbers can increase to 1000.

Quantitative methods

Description

Quantitative Methods is part of the Academic Education and the education in Methodology. As such, it is not the content but the method that is the central point: how to get a reliable answer to a question. You will learn how to tackle problems in a scientific way, to obtain answers from a sample and from problems in economics, finance,... in a reliable way.

Objectives

1.On the basis of some provided data, the student is able to set up relevant research questions. These questions need to be studied using one of the following techniques: logistic regression, factor- and clusteranalysis and reliability analysis

2.An analysis for each of the techniques can be done with the help of statistical software. Also the interpretation of output of software is important

3.The student gains insight in the techniques that are used and in the obtained results

Structuring

The blended structure is sequential: one week offline, one week online. The offline part consists of theoretical lectures, the online part are exercises. The course starts with an online session. This structure was not chosen by the course designer but by the university's policy makers.

Tools

Instruction movies (screencasts explaining the different quantitative techniques and how to use them in quantitative data analysis software) on Toledo (university platform). Exercises that have to be made on a dataset that can be retrieved from the university platform. Possibility to have feedback via skype.

Transition

The course has been Blended since four years. It used to be a complete offline course with lectures and exercises in a classroom setting. University policy makers then decided that students needed more flexibility since the course was given in the evening program. The university wanted to reduce the amount of time students had to spend on campus by 50%. As a result, the decision was made to switch to a blended approach. The course designer was not involved in this decision.

Online publishing

Description & objectives

In this course, we will familiarize ourselves with state-of-the-art online publishing techniques and relevant cultural issues. This entails both a technical and theoretical component: hands-on practice with online publishing tools are balanced by a meaningful theoretical reflection on the phenomena discussed. The students will learn to plan, create, setup and manage a website.

Structuring

The course consists of two parts: Part 1 consists of lecture to introduce the theoretical concepts. Part 2 are practical sessions where students get support to design a website by using a CMS (in this case DRUPAL). The online serves as an extension to the offline activities. So it is used to put on more information, background information, weblectures,…

Tools

Course on Toledo
Open course online on http://www.informatiewijzer.be/online_publishing_0
Use of free available webtools
Weblectures
Online documentation for the CMS (Drupal)
Interactive Q & A sessions

Face-to-face sessions: Part 1: Lectures
Part 2: Support for the web design assignment in groups

Transition

The course has been a blended course from the start. The course designer has a long record in working with ICT in education. He was one of the first presidents of the task force that introduced the educational platform (TOLEDO) in the university. He is constantly adapting the course in terms of less lectures and more online material that students can consult.

Acute and Chronic Diseases

Description

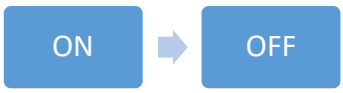
The course contains both theoretical and residential elements and is aimed at providing the students with a medical research-based knowledge of acute and chronic diseases that enables them to diagnose, treat and, rehabilitate patients with common acute and chronic diseases.

Objectives

For ordinary patients, after completing the course, the student should be able to:

1. Receive and correctly communicate with both acute and chronically ill patients
2. Perform the necessary and correct first aid
3. Could record sufficient patient history
4. Perform proper and adequate objective examination of the patient
5. Set up and perform an initial study and treatment program
6. Ordinate necessary paraclinical studies
7. Analyze paraclinical study results
8. Diagnose and treat the most common simple internal medical, general medical, dermatological and orthopedic diseases
9. Could inform patient and relatives about the prognosis of the disorder, the risk of treatment given and the preparation of relevant rehabilitation programs
10. Set up a geriatric investigation program for a complex geriatric medical / surgical patient
11. Ordinate pain treatment and palliation of elderly patients as well as refer to home treatment at the geriatric team
12. Evaluate the symptoms and diseases to be diagnosed and treated in general practice, in the secondary healthcare system, and which require rehabilitation efforts involving other sectors, such as social, labor and education sectors
13. Describe human behavior, reaction patterns and coping strategies and treatment based on biomedical, psychological, social and cultural prerequisites
14. Describe the theory and principles of health promotion, disease prevention, early disease detection and rehabilitation in general practice.

Structuring



The course is an example of the flipped classroom approach. Students consult the online material before attending the face-to-face activities. Dermatology is part of the course. in order to scaffold the students' preparation prior to meeting with the teacher, a large number of videos were produced. These were focusing on explaining essential knowledge and skills in dermatology. Thus, making room for including and discussing relevant clinical cases in the in-class activities.

Tools

Explanatory videos focusing on explaining essential knowledge and skills in dermatology. The videos are posted on the university's platform (Blackboard). Face-to-face sessions: discussion on relevant clinical cases.

Transition

The course was redesigned in 2016. before this transformation the in-class activities in dermatology were primarily based on teacher-centered lectures linked closely to the syllabus. The course designers wanted to change this approach in order to be able to accommodate for the fact that students want to study at other times than curriculum contact hours.

Global Transaction and Intercultural Competence

Description

The course is particularly focussing on the intercultural challenges deriving from global transactions and the intercultural insights and competences needed to act in these challenging contexts. To develop these competencies it works with real cases from the international business world.

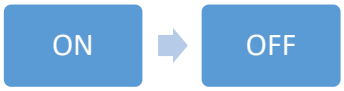
On the basis of theories and methods developed within intercultural communication, cross-cultural interaction and ethnography, the course provides analytical competencies, skills and tools.

Objectives

The objective of this course is that you develop:

- knowledge about global transactions in a changing world
- knowledge about theories on cultural encounters and intercultural communication
- ability to apply appropriate theories and methods to real cases involving intercultural complexities
- intercultural competencies to propose solutions to cases and situations characterized by a high degree of cultural complexity

Structuring



Due to the fact that students attend the course from all over the world the actual face-to-face on-campus time is limited to two weeks. The course has online activities as preparatory activities for the face-to-face activities and, as such, is an example of a flipped classroom approach. After two weeks of face-to-face contact the students go home with assignments (as well home as exam assignment) that are mentored and supervised online.

Tools

Blackboard as a learning management tool (communicator, discussion board, Short 8 minutes videos with lectures, on-hour online sessions uses video and chat function), e-mail, blogging.

Transition

It is a new course and it ran for the first time in 2017.

Health Psychology and Emotion Regulation

Description

Health psychology concerns the many associations between mind and body and emotions and emotion regulation plays a central role in both health and disease. This seminar will present a number of topics within the field of health psychology and theories concerning emotion regulation, for instance including:

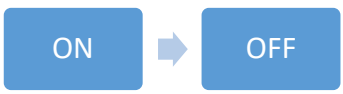
- Emotion and emotion regulation
- Stress and inflammation
- The body in emotion
- The enteric nervous system

Objectives

to define and describe the subject's core concepts
to provide written and oral peer-feedback according to the learning objectives
to select a research question within the field of health psychology and emotion regulation and:

- choose and summarize theories/approaches relevant to the research question
- analyze the research question based on the chosen theories/approaches
- discuss strengths and limitations related to the theories/approaches
- evaluate the empirical support for the theories/approaches
- based on the analyses and discussion reflect upon or formulate hypotheses related to clinical or practical solutions
- write the essay in a clear and academically appropriate language

Structuring



The course is structured according to the principles of the flipped classroom. The students are contacted online via a group announcement on the university's platform and are asked to perform a certain task (e.g. formulate a research question, read a certain article,…). They are also asked to post their ideas on the discussion forum and receive feedback from the course designer and peers. All of this is in preparation of the face-to-face sessions.

Tools

University's platform (Blackboard), blackboard wiki, blog and discussion forum.

Transition

It is a new seminar that was proposed with the purpose of using more blended learning. The seminar was offered for the first time in spring 2017.

Scientific methods

Description

The course provides an introduction to the philosophy of economics, and the most important questions in the economic science such as rational choice, economic methodology and ethical challenges are discussed. Finally, the discussion on economics as a science in the aftermath of the financial crises of 2008 is used as a synthesis of the discussions. Most of the topics have been presented in other courses, but here they will be treated from a philosophical and critical viewpoint.

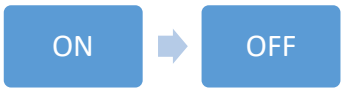
Objectives

At the end of this course, the student should be able to discuss cases of practical interest where the answers by economists to important questions depend on their position in the philosophy of economics. This implies understanding the theories of rational choice, whether they are justifiable as axioms and principles and adequate ad descriptive accounts of actual choice. It also applies knowledge of the methodological foundations of economics i.e. how these methods work, under which condition they work, and what kinds of questions they can answer.

At last almost any important question and possible solution in economics have an ethical content. This is obviously of varying degree but awareness and knowledge of ethical questions in economics is important for any student of economics.

Hence, at the end this course, the students should be able to apply the theories of rational choice and the methodological foundations of economics in order to discuss whether economics is the key to everything, as one could be inclined to believe from the economic literature, where not only economic growth, - stability, - efficiency, and - equality but also justice, love, marriage and happiness is discussed. And where the degree of market influence is seriously discussed in areas like marriage, childbirth, adoption, refugees, hospital care etc.

Structuring



The course is taught as flipped classroom, where students watch online series of video presentations of the material prepared by the lecturer before each weekly class. Each team of students then engages in online activities of a set of weekly exercises, which is further discussed in the weekly exercise class with the teacher. Each exercise team hands in a set of answers to the weekly exercise.

Tools

Video presentations (as well own material as from external sources) and online activities in the University's platform (Blackboard). Face-to-face exercise class consisting of three hours .

Transition

The course was transformed from a conventional format into a flipped format in spring 2016.

ICT project English

Description

The English course is connected to the mobile game creation project the students are working on during their first year spring semester. The course focuses on project management skills and terminology (project plans), marketing (pitching, cv, job applications) as well as presentation skills.

Objectives

The students will be able to:

- write a project plan
- write a cv & job application
- pitch their game to potential clients/investors
- present their game to other experts in the field (live and on-line)
- market their game in an on-line app store
- market their game at a game fair (live situation)
- present their game and degree program to foreign students

Structuring

The course utilizes blended learning in several ways. Whereby online and offline are intertwined. First, it supports the classroom education by offering supplemental materials and assignments for the students. Secondly, the students are expected to read articles and reports given through the lms, and to discuss them both on-line and in class (example: students need to read an article about leadership styles in on-line gaming and discuss this in both the lms and class). The methods of flipped classrooms are also used occasionally – the students are given material to study or a task to do before class and then the class time is used for going over the material/task given (example: students need to familiarize themselves with the on-line market place before class and share their observations in class with others). For the teacher, receiving all the reports and submissions in the same place instead of as printouts or e-mail makes course management much more feasible. (example: cvs) The students also need to collaborate with a foreign partner using fully online tools, while the teacher

can offer some support for this in class.

The backbone of the course is the mobile game project. The students are working on it during the spring term.

Tools

Moodle is the lms used in the course, and it is used for delivering additional materials to the students (in addition to the materials given in class), sending all submissions to the teachers as well as non-synchronous discussions about various professional articles the students are required to read.

e-mail, google hangout, skype, video recording tool, dropbox, mobile game development.

In addition, the students meet on-line with a group of foreign students to present their game and degree program. First, the students e-mail the groups of foreign students to find a time/date for a google hangout/skype (or similar – the students can choose themselves) meeting, then meet with them using the selected tool and finally record a short video of their meeting and its results by using a suitable video recording tool. The videos are shared with the teachers by using dropbox. The contacts with the foreign students are provided by the teachers, the students do not need to find them themselves. This task is only carried out on years when suitable foreign student groups can be found.

The students also need to examine an on-line app-store (googleplay or similar) where their mobile games will be distributed.

Transition

The course has been blended since its first implementation in the spring of 2015. Its predecessors also utilized blended learning.

Physics 1A: Foundations

Description

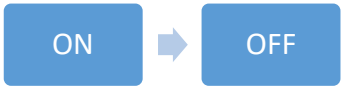
This is an introductory-level course, covering the classical physics of kinematics, dynamics, forces, and oscillations, and touching on aspects of contemporary physics, including relativity and chaos. The course is designed for those with qualifications in physics and mathematics at SCE Higher level or equivalent. It serves both as a preparation for further study in physics-based degree courses, and as a stand-alone course for students of other disciplines, including (but not limited to) mathematics, chemistry, computer science and engineering.

Objectives

On completion of this course, the student will be able to:
1. Demonstrate knowledge and understanding of introductory Newtonian mechanics.
2. Solve problems in introductory Newtonian mechanics.
3. Communicate physics ideas effectively through verbal, written, graphical and mathematical means.
4. Demonstrate self-organised study skills.
5. Demonstrate skills in dealing with real-world, contextualised physics problems.

The course also has some important secondary objectives: students enter the program with wildly different previous knowledge and experience of physics. the course needs to get them all to a common point to allow them to follow the rest of the physics degree programs. it also explicitly sets out to promote and build effective habits of study for university-level education.

Structuring



The course consists of a total of 200 hours distributed as follows:
33h lectures
30 h Supervised Practical/Workshop/Studio Hours
11h online activities
3h feedback/feedforward
15h summative assessment
6h revision sessions
4h Program Level Learning and Teaching
98h Directed Learning and Independent Learning

The course has a flipped classroom approach with face-to-face workshop sessions three hours/week.

Tools

Learn (Virtual learning environment), top hat classroom response system, aardvark (bespoke home-grown content management system), peerwise

Transition

The course has operated in a fully 'flipped classroom' style since the 2011-12 academic year. The current presentation of the course makes heavy use of the vle with extensive additional resources (course notes, practice problems, self tests) only available online, and vle tools (quizzes etc.) used to facilitate a limited implementation of just in time teaching. in-person sessions (flipped lectures and problem workshops) are complemented by the online presence of the course.

Prior to going fully-flipped, the course was not conventional: it had for many years employed active learning techniques such as in-class voting and research informed pedagogies such as workshop physics.

Foundations of Academic Practice

Description

This course is one of the routes for academics in the UK to gain accreditation for teaching. as a result, the course should be viewed as a cpd program per se, and the course design has to take into consideration the fact that the students are all full time teachers who have very busy working schedules.

Objectives

There are three rationales for the course. First, the course will meet the need for professional development of colleagues as accredited by the Higher Education Academy, and as set out in the UK Professional Standards Framework (PSF). The emphasis of this Framework, and of this proposed course, is on supporting colleagues to enhance their scholarly understanding of learning and teaching. The proposed course is designed to build on our colleagues' own practice and to encourage them to reflect on this in a critical manner with a view to improving on it.

Secondly, the course will enable colleagues to contribute to designing and delivering the high quality learning environments and learning experiences set out in the University's Learning and teaching Enhancement Strategy. The chief aims are:

to strengthen and enhance the quality of students' experiences of university study wherever necessary, appropriate and practicable to sustain an environment in which excellence in learning and teaching can thrive and where refinements and innovations in practices are prized and promulgated to encourage everyone involved in teaching and supporting learning to play their part in enhancing as well as ensuring quality

The remit of this course is to prepare colleagues to deliver this vision through critically reflecting on, and developing, their own academic practice within the University.

Thirdly, it provides the opportunity to support colleagues in the development of their research careers, and in this way to make an active contribution to the research strategies of their Schools.

Structuring

The course is made up out of four blocks. Three of the are mainly offline althougfh there is an aspect of the flipped classroom since preporatory material is offered online. One block is taught fully online. All four blocks are supported by a blog.

Tools

Learn (virtual learning environment), online poll, videos

Transition

It is a new course that started in blended mode in the academic year 2017-2018.

Reproductive Biology Honours

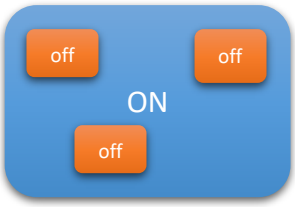
Description

The blended approach in this course is used in a couple of ways, including getting all students to work in groups to write wikipedia pages and develop a critical appraisal of a topic using wordpress as a platform.

Objectives

The aim of the course is to provide general support and advice on personal and professional development, including the opportunity for students to consider their own weaknesses and strengths.
On completion of this course, the student will be able to:
1. Accept the personal attributes and behaviours required of a professional
2. Engage in reflective activity in terms of self-appraisal
3. Recognise the importance of good communication
4. Recognise sources of stress and methods for mitigating it.
5. Develop effective time management, independent learning and study skills and Appreciating the value of giving and receiving constructive feedback

Structuring



The course is structured based on the SLICC principle (Student-Led Individually Created Courses: https://www.ed.ac.uk/employability/slicc/about) whereby individual reflection is of the essence. Students have very few offline sessions. The backbone to the course is an e-portfolio.

Tools

e-portfolio of learning (Pebble Pad), wikipedia

Transition

The blended approach has been used in the student selected components at the medical school for about 15 years, so it is a very well established practice. More than one course has adopted this approach.

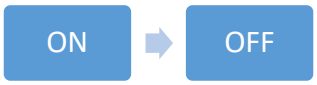
Mathematics

Description & Objectives

Mathematics is taught throughout different programs at the university. So instead of a single course approach the university opted for an overarching view on mathematics education. Four educational principles guided the design process:

- Activation (active learning, active participation of students)
- Conceptual understanding
- Feedback
- Contextual problems (related to the field)

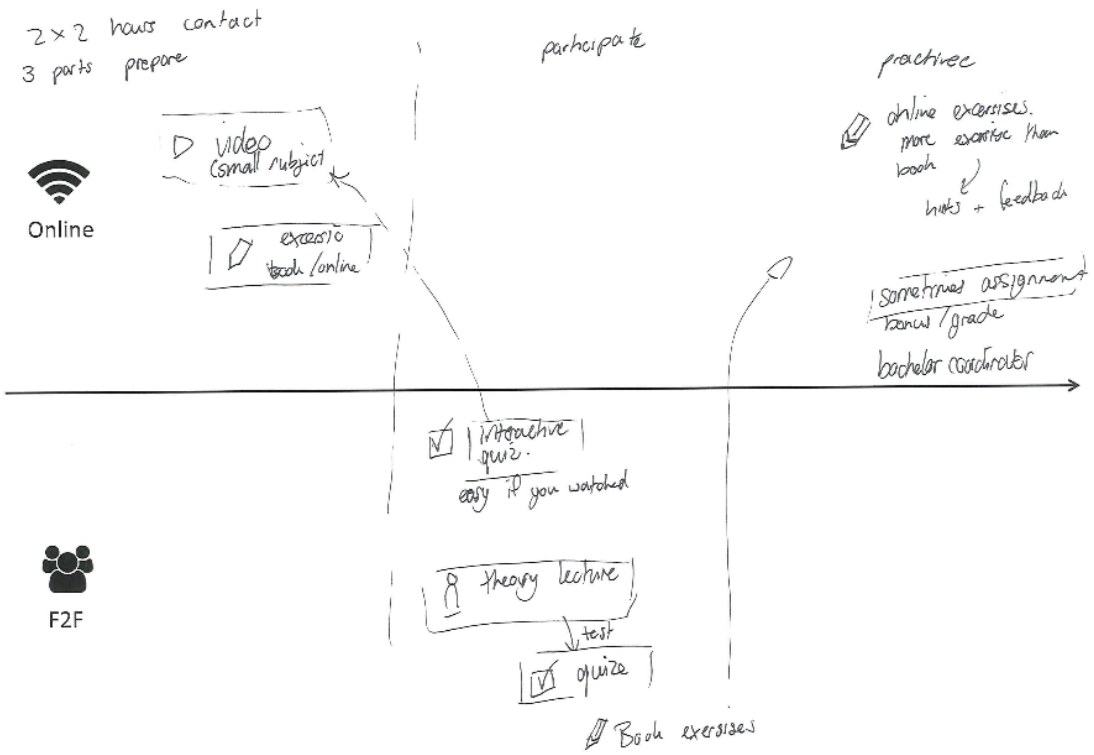
Structuring



The flipped classroom approach is used.
"In the flipped classroom students watch recorded lectures in their own time and classroom time is used for more interactive sessions. In this project, students prepare the face-to-face sessions at home, by watching video lectures and doing simple exercises. In this phase students activate their prior knowledge and acquire new knowledge. This knowledge and understanding is then tested during the face-to-face session using interactive questions using FeedbackFruits (see Fig. 3).

Instructors also introduce new concepts, often based on contextual problems, and students work on problem-solving by doing exercises from the textbook. After the lecture, students process the new concepts by solving computer-aided problems (with automated feedback), exercises from the book and working with interactive applets" (Gordijn, Oosterhout & Dijkstra, 2017: 6).

As visualised by the course designer:



Tools

Online learning environment (Blackboard) integrates: Video lectures, interactive quize system Feedback Fruits, applet for calculus, MyMathLab.

Transition

“A new blended approach was first used during the pilot phase of the project (study year 2014-2015) to design four first-year mathematics courses, each for a specific faculty. After the pilot phase, all four courses of the pilot were again taught using the new approach. Moreover, they were each ‘duplicated’ for another faculty. During the first two years of the project, 32 instructors taught a total of 12 maths courses to over three thousand students using the new approach.

The project team now consists of a senior project manager, a junior project manager, eight instructors, an educational advisor, an e-learning developer and three student assistants. Each course has a responsible instructor. This instructor is responsible for the course schedule, enrolment, groups, grading, etc. The project team then develops the course materials and supports the responsible instructor during the course. The designed course is taught by a number of instructors. In order to create more personal contact between

instructors and students, teaching groups consist of about 40 students per group. All courses are evaluated with the project team and the instructors who taught the course.

The courses are structured using a consistent flow and materials have been developed for the different types of learning activities by the members of the project team." (Gordijn, Oosterhout & Dijkstra (2017: 3)

References:

Gordijn, Oosterhout & Dijkstra (2017). Innovation mathematics project, blended education in practice: a case study at Delft University of Technology. EDULEARN17 Proceedings . 9940-9950. 10.21125/edulearn.2017.0881

Propulsion and power

Description

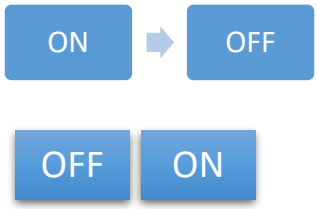
The course is offered in the 2nd year of the Aerospace Engineering Bachelor degree program.

Objectives

The course is based on the following learning objectives. At the end of the course a student is able to:

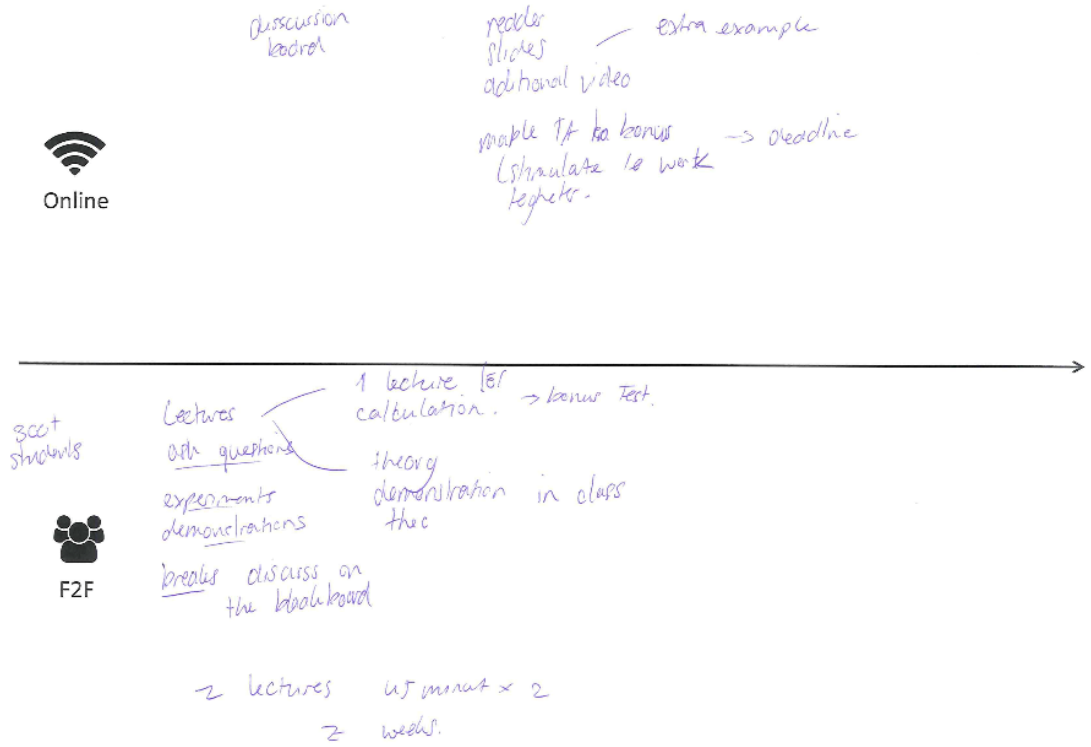
1. Understand the basic principles of thrust and power producing mechanisms for aerospace vehicles.
2. Perform basic sizing of thrust and electric power generation systems suitable for aerospace vehicles.
3. Describe the various components of a gas turbine engine, their working principle and be able to explain factors that determine their performance.
4. List/describe/explain: the main thrust and electrical power generation options available; the (main) components that make up the propulsion and electrical power generation system and their function; the current limits to thrust/ power generation.
5. Apply control volume analysis and integral momentum equation to estimate the thrust produced.
6. Apply physics to predict the electric power generated by solar photo-voltaics, batteries, and electrical generators.
7. Develop system models from schematic system descriptions.
8. Size the electrical power system for a given mission.
9. Select the appropriate propulsion/power system from basic types depending on system requirements.
10. Assess the effect of changes in design/operating parameters on system performance.

Structuring



The course is an example of the flipped classroom. Interestingly the two lecturers each opted for another approach. One of them used the 'pull' approach (online material as an extension of the face-to-face class) , the other one the 'push'approach (theory was offered online before the face-to-face class that is intended for exercises).

As visualised by the course designer:



Tools

Virtual Learning Environment consisting of: lecture slides, videos (as well material from others as self-produced material)

Transition

"The previous course format was based on a total of 14 ''traditional'' lectures in class (2 hours per lecture): 2x7 hours on air-breathing propulsion (first lecturer), 2x7 hours on electric power systems and rocket propulsion (second lecturer)." (Cervone, Melkert, Mebus & Sauners-Smits, 2016: 1914). The course was offered as a blended course for the fist time in the Academic year 2014-2015.

Reference

Cervone, A., Melkert, J., Mebus, L.F.M., Saunders-Smits, G.N. (2016). Push or Pull Students into Blended Education: a Case Study at Delft University of Technology. International Journal of Engineering Education 32(5(A)):1911-1921.
https://www.researchgate.net/publication/308720383_Push_or_Pull_Students_into_Blended_Education_a_Case_Study_at_Delft_University_of_Technology

Mechanics of materials

Description

A first year course in the Bachelor of Engineering program in the subject area of Mechanics of Materials.

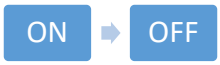
Objectives

By the end of the course, students will be examined on their ability to:

• Use mechanics to solve basic problems dealing with the stress, strain, displacement of structures in static equilibrium under mechanical & thermal loads.

• Draw conclusions for basic structural design

Structuring



"A flipped-classroom approach was implemented whereby "Students prepared for lectures via guided learning units organized within the blackboard learning environment. These learning units consisted of a mixture of blended learning videos, short readings, and simple concept questions. Preparation for each lecture (two lectures per week) was limited to 30 minutes of activities, with a margin of an addition 30 minutes for re-watching/reading specific elements and for taking notes." (Rans, De Freitas, van Campen & Saunders-Smits, 2016: 6).

As shown by the figure below:

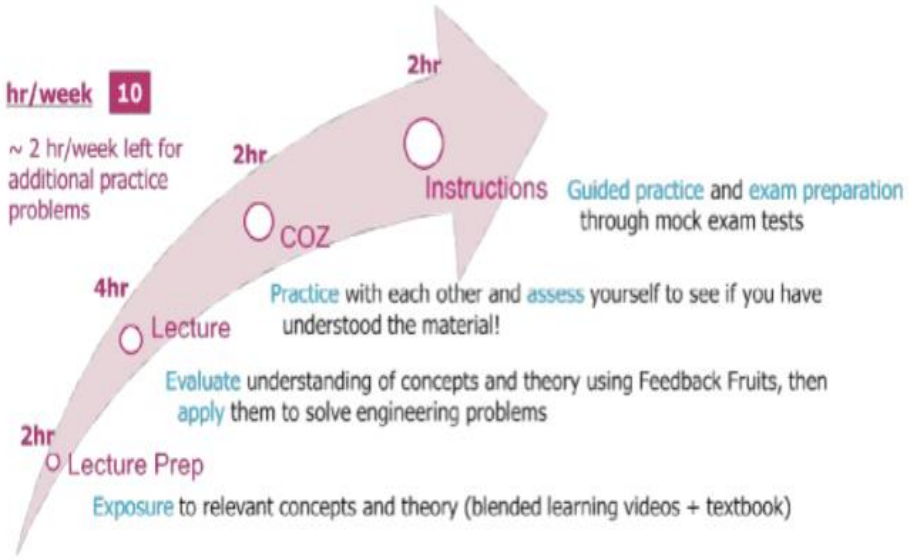


Figure: Weekly breakdown of student activities and time requirements (Rans, De Freitas, van Campen & Saunders-Smits, 2016: 6)

Tools

Blended learning videos (https://www.youtube.com/c/CalvinRans in the playlist Mechanics of Materials), online polling software (feedback fruits), digital homework system.

Transition

“The previous setup of the course was based on delivery of the course content via 14 “traditional” in-class lectures, each of 2 hours in length, over a 7-week period. These lectures focused on theory development with some simplified examples for demonstrating the application of concepts learned. A mandatory weekly computerized homework systems was employed to ensure a minimum level of self-study was being completed by the students.” (Rans, De Freitas, van Campen & Saunders-Smits, 2016: 3).

Reference

Rans, C.D., De Freitas, S.T., van Campen, J.M.J.F. & Saunders-Smits, G.N. (2016). *(Blended Learning)2 . Blending content- and learning-oriented objectives in a blended learning environment*. in Proceedings of 44th SEFI Conference, Tampere, Finland, September 2016

Transport Phenomena

Description

The course is spilt in two parts: basic and advanced. In Basic Transport Phenomena, the transport and transfer of momentum, heat and mass are studied. To understand these processes which often take place simultaneously, the underlying concepts will be covered in this course. The advanced course is for engineers who want to refresh their knowledge, engineering students who are eager to learn more about heat/mass transport and for all who have fun in explaining the science of phenomena in nature.

Objectives

Students will learn to:

Basic course:

1. Identify heat transfer, mass transfer and fluid flow phenomena in lab, industrial and daily environment
2. Identify quantities and subjects used in transport phenomena
3. Use balances to solve problems
4. Apply the concepts of transport phenomena to a variety of real life problems
5. Make the correct assumptions to put real-life situations into mathematical model
6. Solve and assess a model from a quantitative perspective
7. See the world through different eyes

Advanced course:

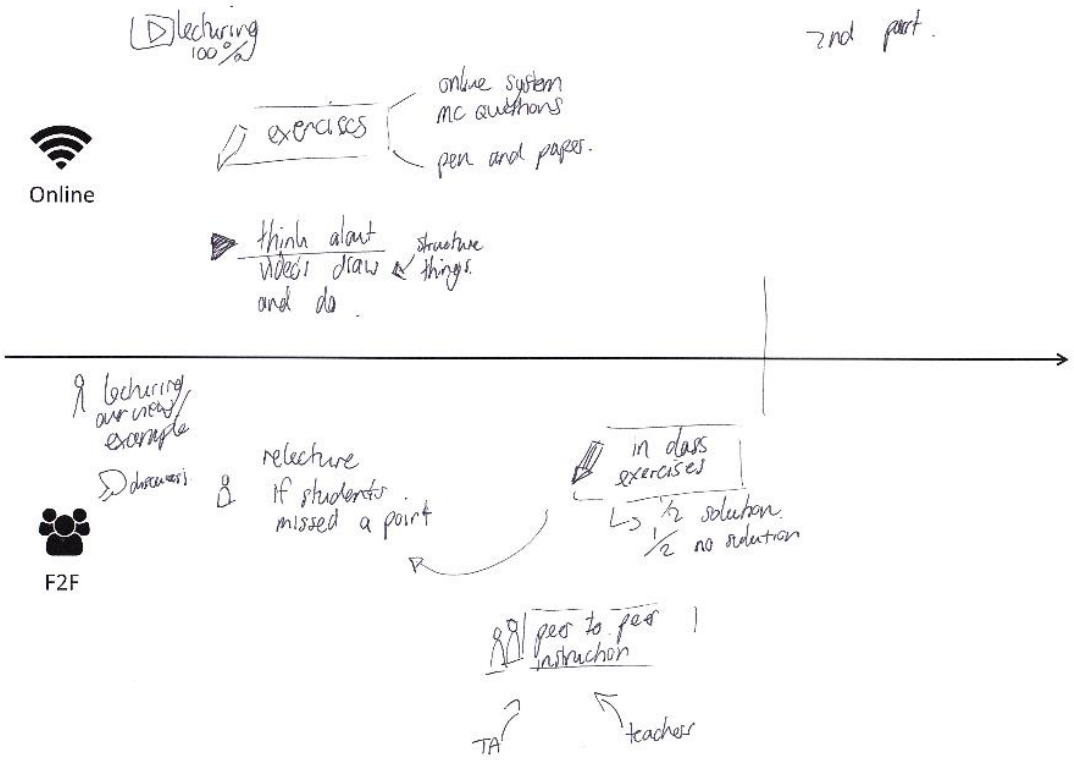
- Microbalance and an overview of heat conduction and diffusion problems
- To calculate the pressure loss over pipe and pipeline systems
- The definition of convective transport of heat and mass transfer and how you can apply it
- The distribution of components over immiscible phase and the importance of this distribution for many applications
- The difference in flow behaviour of water and toothpaste and the reasons of this difference
- The definitions of heat radiation, black and grey bodies
- How to calculate the heat loss by radiation

Structuring

ON → OFF

The course is available as a MOOC on Edx. On campus students have an offline component supporting it. Lectures and exercises online. Feedback on them is given in the face-to-face sessions.

As visualised by the course designer:



Tools

MOOC on Edx platform

https://online-learning.tudelft.nl/courses/the-basics-of-transport-phenomena/

https://online-learning.tudelft.nl/courses/advanced-transport-phenomena/

Transition

Three years ago the course was conceived as 'interesting to turn into a MOOC'. Improvements are still going on due to the fact that the course designers are puzzled student success rates that were at first not good and, despite interventions, were not at a higher level than face-to-face classes.