Universitat Autònoma de Barcelona

2021/2022

Design Science and Praxeology

Code: 43837
ECTS Credits: 6

Degree	Type	Year	Semester
4316227 Applied Philosophy	OB	0	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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Use of Languages

Principal working language: english (eng)

Prerequisites

None

Objectives and Contextualisation

One of the signs of our time is the interrelation between science and technology. On the one hand, scientific knowledge is the basis for the construction of technological artifacts and, on the other, technology reverts to scientific progress. Philosophical reflection on the application of science to practical issues becomes essential at a time when applied sciences or design sciences cover a good part of scientific practice. In this sense, praxiology offers a model of how to achieve a practical goal with maximum efficiency possible.

The central themes of this module will be the following:

Differences between science and technology according to the objectives, methodology, values and their impact on society.

Theoretical frameworks: the "artificial or design sciences" (engineering, medicine, librarianship, education, information sciences, etc.), disciplines whose objective is not to describe the world but to transform it; and "praxiology", science of efficient action, with three fundamental elements: the theoretical basis, the instrumental basis and the actions.

Cognitive models that study technological designs that take into account the cognitive abilities of users in order to facilitate the tasks necessary to achieve the proposed objectives.

Case studies in which the proposed models would be applied, for example, natural catastrophes, accidents resulting from human errors in all phases of the chain and the analysis of disciplines applied as design sciences.

Competences

- Continue the learning process, to a large extent autonomously.
- Establish and apply the implications that scientific knowledge and research have for advanced philosophical research.
- Organize ones own time and resources to undertake research: design a plan by prioritizing objectives, schedules and commitments.
- Reconstruct and analyze critically the positions of the main current researchers in the field of philosophy of each of the main subject areas of the masters degree (science, art, politics) using their characteristic categories and lexis.
- Relate the concepts and knowledge of the various areas of current philosophical research in relation to dependencies between science and technology, and the ethical and political implications of such dependencies.
- Search for, select and manage information autonomously, both from structured sources (data bases, bibliographies, specialized journals) and from information distributed on the web.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

Learning Outcomes

1. Apply the bodies of theoretical knowledge in philosophy of science and ethics to practice in science and technology.
2. Compare scientific models and second-order philosophical theories on scientific research.
3. Consider, analyse and criticise the socio-political impact of new technologies.
4. Continue the learning process, to a large extent autonomously.
5. Organize ones own time and resources to undertake research: design a plan by prioritizing objectives, schedules and commitments.
6. Search for, select and manage information autonomously, both from structured sources (data bases, bibliographies, specialized journals) and from information distributed on the web.
7. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

Content

1. The naturalization of the philosophy of science (9-10-17) It will be explained what is the naturalizing program of epistemology and the philosophy of science against a philosophy of a priori. The proposals of some of the most relevant defenders and detractors and the different ways of naturalizing will be analyzed, namely: methodological naturalization (L. Laudan), analogical (S. Toulmin and D. Hull) and reductionist (W. van O Quine and P. Churchland).

2. Science and technology (16-10-17) The relationship between science and technology will be addressed with respect to the debate about their differences versus the function of both. The influence between science and technology will also be examined in two directions: one that goes from science to technology and the other that goes in the opposite direction. The first is the one that has been studied the most and corresponds to the study of the social consequences of technology. The second means that technological innovation reverts to more development of science and knowledge in general.

3. Design sciences (23-10-17) Design sciences will be introduced as one of the theoretical frameworks for applied science. Design sciences are understood as the disciplinary fields that are the result of a process of scientification and mechanization of the arts in the sense of skills and practical activities. Disciplinary fields such as engineering, medicine, architecture, economics, education, etc. s sciences that are interested in "design", in the sense of goal, purpose or goal to achieve, that is, do not aim to describe the world but to transform it.

4. Praxiology (30-10-17) Praxiology is the science of efficient action, which is why it is a crucial model for design sciences. The background of this epistemological model will be analyzed, the structure of its statements and arguments, as well as the elements and characteristics of it. Of special relevance are

the concepts of progress, scientific change and scientific revolution because of the differences between these concepts in the pure and applied sciences. Consequently, the paradigm changes devised by T.Kuhn need to be reformulated from praxiology.

5. The context from the cognitive models (6-11-17) In both the design sciences and in praxiology the context in which they develop is of capital importance, intervening social, political factors, etc. If we take into account the naturalizing program, there is no doubt that cognitive models will be relevant to these theoretical frameworks on which we have focused for applied science. Various models will be analyzed that take into consideration the context, both corporal and social, in cognitive processes, which will lead to questioning the unit of cognition. In this sense, socially distributed cognition and the extended mind will be examined in a special way.

6. Error and knowledge in pure and applied science (13-11-17) To err is a part of human nature but also it is to try to avoid mistakes. Errors will be analyzed from the epistemological, psychological and engineering perspectives, showing the need for all these factors to converge in the realization of any theoretical and practical activity. Special emphasis will be placed on the role of design in the commission of errors, analyzing cognitive models such as that of D. Norman and his theory of cognitive design.

7. Innovation, invention and discovery (20-11-17) Innovation, invention and discovery are concepts that have always been present in science to address the phenomena of scientific change. However, traditionally, discovery had the sense of changes in the pure sciences and innovation referred to changes in those applied. Currently, we can say that any change in any field is called innovation. In this sense we will analyze the different meanings of these concepts and their implications for design sciences and for scientific progress. For this, epistemic and contextual values and social, political, ethical, etc., implications will be taken into account.

8. The scientific study of creativity (27-11-17) Sometimes creativity is identified with innovation, however, there are important differences between the two concepts, although they are closely related to each other. Creativity underlies innovation, but while the former is attributed to an individual agent, the latter are associated with the introduction of novelty in some context. From the outset, it could be said that innovation implies some degree of creativity but not vice versa, that is, creativity does not automatically imply innovation. Innovation would be the result of "some" creative processes because not all are reflected in innovations in the corresponding field.

9. The democratization of innovation (4-12-17) The democratization of innovation can be approached from different perspectives. One of them is that innovations reach all layers of society and thus are not in function of their economic capacity, that is, to extend distributive justice to the innovations that are emerging. Another is the intervention of users in innovation processes, as proposed by E. von Hippel. Of course, these are not the only means of democratization, but they are two very important ones that are at the basis of many of the inequalities in access to innovations. We will analyze these approaches by providing practical examples.

10. The epistemology of design (11-12-17) Design epistemology escapes the classical sense of a branch of philosophy, such as epistemology, which seeks the foundations of scientific knowledge. The interest that has awakened lately responds to several factors but two of the most important are, on the one hand, the naturalist approach in epistemology and, on the other, the overlap, although not fusion, of scientific knowledge and its practical application. On the one hand, we have design epistemology as an alternative to classical epistemology, on the other hand, a series of characteristics, among which we can highlight interdisciplinarity and a social concern through "design thinking" that revolves around design human scale.

Methodology

Master classes ◊ Oral presentation of works ◊ Debates ◊ Problem-based learning and case studies ◊ Seminars ◊ Tutorials ◊ Preparation of works ◊ Personal study ◊ Reading of articles of interest.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Supervised			
Master classes ◊ Oral presentation of works ◊ Debates ◊ Problem-based learning and case studies ◊ Seminars ◊ Tutorials	50	2	1, 6, 2, 3, 5, 7, 4

Assessment

Revision will programmed according to the schedule of the University administration.

Plagiarism:

- In the event that tests or exams cannot be taken onsite, they will be adapted to an online format made available through the UAB's virtual tools (original weighting will be maintained). Homework, activities and class participation will be carried out through forums, wikis and/or discussion on Teams, etc. Lecturers will ensure that students are able to access these virtual tools, or will offer them feasible alternatives.

In the event of a student committing any irregularity that may lead to a significant variation in the grade awarded to an assessment activity, the student will be given a zero for this activity,
regardless of any disciplinary process that may take place. In the event of several irregularities in assessment activities of the same subject, the student will be given a zero as the final grade for this subject.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Forum	25%	5	0.2	1, 6, 2, 3, 5, 7, 4
Oral presentation of works	50%	50	2	1, 6, 2, 3, 5, 7, 4
Personal study	25%	45	1.8	1, 6, 3, 5, 7, 4

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Software

None