

# Mechanical Engineering

**Process Engineering, Production Technology, Automotive Technology, etc.**

Course: Mechanical Engineering  
Group of courses: Engineering  
Provided by: Dr. Ing. Kira Stein  
Last edit:

## Table of contents

<b>Course objectives</b> .....	2
<b>Teaching content/subject-specific gender studies content</b> .....	2
<b>Integration of gender studies content into the curriculum</b> .....	3
<b>Degree Stage</b> .....	4
<b>Basic Literature/Recommended Reading</b> .....	4
<b>Journals</b> .....	4

## Course objectives:

Students should be taught to see that technology is not value-free and gender-neutral. Its contents, methods, solutions, organisation of labour, and recruitment mechanisms are all influenced by the subjective experiences, emotions and personal interests of those involved. The participation of women (and likewise older people, people with disabilities, children, and people from different cultural backgrounds) is not simply a question of creating equal opportunities and promoting democratic participation in an area of increasing importance in our daily lives. It is also and perhaps even more importantly a vital prerequisite to achieving high-quality products and production processes and ensuring their environmental and social acceptability, as well as the desired customer orientation. Today's technology should be considered in a historical context and in relation to the development of the role of gender.

The myth that technology is a male area should be challenged. In its place, students should be presented with an up-to-date image of the profession one in which women hold their rightful, natural position.

## Teaching content/subject-specific gender studies content:

### Development project:

Students complete a team-based project. The aim of the project is to produce a user requirement specification/functional specification and/or to evaluate and select a development solution, from a range of possible options, for a specific problem or everyday product, e.g. a mobile phone or food processor.

The development project encompasses the following tasks:

- The problem should be examined in detail. Students should not only look for purely technical solutions, they should also be taught to see these solutions in their social context. In other words, they should be searching for solutions which resolve both the social and technical issues at the same time in an intelligent way.
- The problem and the resulting specifications should be analysed from a range of perspectives, i.e. those of all the different actors and parties involved. On this basis, students should develop appropriate solutions (technical gadgets versus simplicity of use; raising students level of empathy, e.g. through role play).
- Students should check the different solutions by examining their impact on people and the environment. They should do this by developing scenarios then analysing and evaluating them from various different perspectives (this serves as a brief introduction to integrated technical evaluation).
- The eventual users and/or customers should be involved as far as possible, or students should explicitly take on these roles themselves. This could include contacting senior citizens organisations, consumer and environmental bodies, and mothers; attempting to include the students' own life experience in the products; studying the literature on the gender-specific requirements of products such as cars, etc.
- Students should consider what proportion of costs should go on utility, and what proportion should go on areas such as serviceability, modular construction and image.
- A planning technique or role play should be used to allow students to practise presenting their results and explaining how decisions are reached in a way that is readily understood by non-specialists.

- Finally, students should reflect on their experiences by playing different various roles and examining the results from different perspectives.

Within the framework of the development project, other methods of quality management or systematic construction can be used to broaden students' horizons and perspectives. This could include, for example, drawing up a mind map (as a way of recording and structuring different issues), an ishikawa or fishbone diagram (showing different stakeholders), quality function deployment (QFD, weighting requirements and customer wishes to reveal any conflict of targets), or a failure mode and effects analysis (FMEA, estimating the impact on people and the environment).

The composition of the student teams should be carefully controlled to ensure that they are well-mixed or, alternatively, single sex. Care should be taken that tasks are not distributed within the teams in a stereotypical way.

#### **Work placements/reflection on professional practice:**

Courses should include a seminar aimed at encouraging students to reflect on their work placements. Students should be brought into contact with female engineers, ideally during their work placements, but at the very least during this seminar. They should be encouraged to reflect on issues such as their own experiences and behaviour, the modern image of the profession, the key professional skills (qualifications) required and how the different genders stand in relation to these, their own professional skills and any gaps in these, the way different technical products are associated with different genders (e.g. "sewing machines" versus "lathes", i.e. the idea of technology as a male area), and promoting women as a way of challenging male thinking.

The discussion should take place in single-sex groups. Lecturers should make sure that both gender perspectives are presented and fully considered.

#### **Seminar on the History of Technology**

In historical context, not only can significant changes in the development of certain machinery and technology and their importance be demonstrated excellently, but also the circumstances, actors and interests that have promoted or hindered the development and its impact. This includes the mechanisms by which women were excluded from this development, although they were included in the history as responsible for the obtainment of food, making clothes and building houses, so have therefore always applied and developed technology (gardening, pottery, textiles). This leads to questions such as for example, who defines what technology is, how did it come to the connection between technical competence and masculinity and how does this relate to the development and professionalization of the engineering profession.

#### **Social and ecological relevance:**

Individual subject disciplines and products should be placed in the context of technological advance in society as a whole, their social and ecological relevance, social responsibility for technological developments, the economic issues, politics of power, personal interest, and the interplay between technology and society. Students should examine what drives particular technical products and processes what purpose do they serve, and who are they for?

## **Integration of gender studies content into the curriculum:**

Offering isolated gender modules like attempting to teach separate key professional skills rather than technical knowledge has not proved particularly successful in the field of Mechanical Engineering. Integrated teaching is more effective.

The development project, work placements/reflection on professional practice, and the examination of social and ecological relevance should therefore be integrated into the regular modules. History of technology can be offered as a separate seminar. However, to ensure that gender issues are dealt with properly, separate credits should be awarded. This is currently the best way to guarantee acceptance by students.

## **Degree Stage:**

The development project should be carried out at the beginning of degree courses (in the introductory phase) as it helps establish a certain way of thinking for students. This should then influence the development and construction projects that students carry out later on, when they have greater technical knowledge.

The reflection on professional practice should take place as soon as possible after students finish work placements (the schedule for these will have been established earlier).

History of technology should be placed at a stage where basic knowledge of machinery, technology and production have already been taught at university and the knowledge of them exists. The examination of social and ecological relevance should be integrated explicitly into all modules. (The possibility of integrating women by making structural changes to the entire degree set-up is not different for Mechanical Engineering than for other disciplines).

## **Basic Literature/Recommended Reading:**

- [1] Greif, Moniko; Stein, Kira: Ansätze feministischer Technikgestaltung, gemeinsame Erarbeitung eines Lastenheftes in: Hypatia (Hg): Dokumentation des 25. Kongresses von Frauen in Naturwissenschaft und Technik 13.-16.5.1999 in Darmstadt; FiT-Verlag, Darmstadt 1999
- [2] Greif, Moniko: Ansätze feministischer Technikkritik - die männliche Monokultur in der Technik ist nicht nur ein Frauenproblem in: Wächter, Christine (Hg), Frauen in der technologischen Zivilisation; München: Profil 2000 (Technik und Wissenschaftsforschung, Bd, 35)
- Wajcman, Judy: Technik und Geschlecht; Die feministische Technikdebatte; Frankfurt/M., NewYork 1994
- NUT e. V. (Hg): Memorandum zum Bundesbericht "Forschung1993", Eigenverlag Verein Frauen in Naturwissenschaft und Technik (NUT e.V), Berlin 1993
- Erlemann, Christiane: Das Technische ist politisch - Frauen als Subjekte der Technologieentwicklung, Forum Wissen-schaft , Nr. 4, 1989, S. 30-34
- Greif, Moniko und Stein, Kira (Hg) : Ingenieurinnen - Daniela Düsentrieb oder Florence Nightingale der Technik, Mössingen-Thalheim : Thalheimer Verlag 1996, Schriftenreihe NUT - Frauen in Naturwissenschaft und Technik e.V., Band 3
- Schade, Gabriele: Die Wirkung "weiblicher Kompetenzen" im Software-Entwicklungsprozess in: TH Illmenau (Hg) : Entwicklung und Einsatz von informationstechnischen Lösungen - auch eine

Frage des Geschlechts? Illmenau 1997

- Saatweber, Jutta: Kundenorientierung durch Quality Function Deployment, Carl-Hanser Verlag München, Wien 1997

## **Journals:**

Es gibt keine spezielle Fachzeitschrift für Gender im Maschinenbau. Hier muss auf allgemein technikkritische oder technikgeschichtliche Zeitschriften zurückgegriffen werden

Den Vorstellungen am nächsten kommen die Zeitschriften Koryphäe, Wechselwirkung und Soziale Technik (IFZ Graz) mit einzelnen Beiträgen.

Die Rundbriefe der Vereine Frauen in Naturwissenschaft und Technik (NUT e.V.) und des deutschen ingenieurinnenbundes (dib e.V.) enthalten sehr gelegentlich einzelne Beiträge zum Thema.