Responsible Conduct of Research for PhD students in engineering

ECTS:	2 ECTS (0.5 ECTS per module)
Number of students:	20
Teachers:	Katrine Astrup Jacobsen (SDUB)
	Søren Jensen (TEK)
	Kirstin Remvig (SDUB)
	Evgenios Vlachos (SDUB)
	Heidi Maglekær Jensen (TEK)
	Davide Giacalone (TEK)
Language:	English (Danish if only Danish speaking students participate)
Assessment:	To earn course credits, students are required to attend all classes and must upload the home assignments of modules 1, 3 and 4, as well as complete the e-learning session in module 2.

Aim

The course introduces PhD students from engineering to basic concepts, principles, and norms concerning responsible conduct of research. By stimulating awareness, reflection, and discussion of academic integrity and good scientific conduct, the course supports PhD students in establishing responsible research practice, including conducting research in accordance with scholarly and societal rules, principles, and guidelines, as well as current practices at SDU.

The course addresses scholarly, ethical, and legal aspects of the research process, including research planning; data management; key elements of scholarly publishing, authoring and authorship.

Course overview

The course consists of the four modules:

- Module 1: Academia and responsible conduct of research
- Module 2: Laws and regulations
- Module 3: Research data management
- Module 4: Publication, authorship, and peer reviewing

Form

The form of the modules varies:

- Module 1: Introductory lectures with group assignments
- Module 2: Online learning session (non-live) and lecture
- Module 3: Introductory lectures with group assignments
- Module 4: Introductory lectures with group assignments

Each module comprises three hours workload. For each module there is approximately two hours of preparation and/or follow-up.

All four modules must be completed.

The course is supported by SDU's digital learning platform. Slides will generally be available after the teaching. The online session in module 2 will be open after first course day.

All assignments must be uploaded one week after the last course day.

Module 1: Academia and Responsible Conduct of Research

This module introduces terminology and raises awareness and reflection on responsible conduct of research (RCR) and irresponsible conduct of research, and the consequences hereof.

Learning outcomes

Upon completion of the module, participants:

- Will have an advanced understanding of the principles of responsible conduct of research
- Can account for their own research projects in terms of the principles of responsible research practice
- Can actively integrate the principles of responsible conduct of research into their own research practice, and disseminate these principles as peers, supervisors and teachers

Contents

- Research integrity and responsible conduct of research
- Research misconduct, academic carelessness, and temptations for cheating – active and passive forms of misconduct
- Preventing misconduct
- Questionable research practice
- Dealing with suspicions
- Conflicts of interests
- Individual and collaborative research

Form

Classroom, discussion-based teaching (3 hours). Home assignment before and after the module.

Preparation

- Singapore Statement on Research Integrity (https://www.wcrif.org/guidance/singapore-statement)
- The Danish Code of Conduct for Research Integrity. Danish Ministry of Higher Education and Science. Nov 2014. (https://ufm.dk/publikationer/2014/the-danish-code-of-conduct-for-research-integrity)
- Fanelli D: How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data, PLoS ONE 2009, 4(5)

Other preparations

Participants are required to upload a one page version of their project description (in SDU's digital learning platform) before class. Before class, participants will be grouped and are required to read the other group members' project descriptions. In class, each participant is required and comment on and discuss the other group members' project descriptions in relation to responsible research practice.

Assignment

After the module, participants must submit a one page essay where they briefly describe which elements of RCR that may particularly challenge their PhD project, and which actions they intend to take to safeguard these elements of RCR in their projects. The essay must take the course outcomes into consideration.

Teacher

Katrine Astrup Jacobsen, research librarian, University Library of Southern Denmark

Module 2: Laws and regulations

The module introduces principles, laws and regulations enabling participants to conduct research in a responsible way and according to the possibilities of the profession of scholarship, as practiced at SDU.

Learning outcomes

Upon completion of the module, participants:

Knowledge and understanding

- Have a basic understanding of the legal regulation of research in Denmark
- Have a basic understanding of copyright legislation in Denmark
- Know the principles of authorship, as these are described in the Vancouver Protocol
- Are aware of the rules for printing, copying and scanning works for use in teaching
- Know the IPR system and relevant legislation on inventions

Skills

- Can identify works protected by copyright
- Can distinguish citation and fair use from plagiarism

Competences

- Can relate ethical and legal issues to their individual research field
- Can understand, reflect on and assess relevant aspects of ethical and legal issues concerning their research and teaching tasks
- Can apply information from the patent system in the research process

Contents

- Research & Copyright
- Who owns the research? (Research Data & Property Rights)
- Plagiarism, source references and good citation practice
- Declarations of authorship
- Teaching & Copyright
- Patents and IPR

Form

The module combines classroom teaching with an online learning module. The online learning module will be open after first course day.

Activity

Participants must complete the e-learning session and attend the lecture in class. The e-learning session contains learning objects (reading materials and videos) integrated with ongoing tasks that train and challenge understanding, reflection, and awareness about legal issues related to scientific work. All e-activities must be completed.

Teachers

Søren Jensen, associate professor, SDU Innovation and Design Engineering, Department of Technology and Innovation

Kirstin Remvig, information specialist, University Library of Southern Denmark (e-module)

Module 3: Research Data Management

This module introduces responsible conduct when collecting, handling, sharing and storing research data. It is not on methodology as such but addresses aspects of ethically responsible conduct which are often neglected in methodology courses.

Learning outcomes

Upon completion of the module, participants:

Knowledge and understanding

- Understand what research data management (RDM) entails from the perspective of the research data lifecycle
- Recognize the importance of managing research data in line with the SDU Open Science Policy
- Know the main stakeholders in RDM and have a basic understanding of their requirements
- Understand the importance of transparency and reproducibility in research

Skills

- Can distinguish between FAIR data and Open Data
- Can write a data management plan
- Can identify where to store, preserve and publish research data and their metadata
- Can distinguish among misconduct, honest error and scientific disagreement when dealing with research data
- Can reflect upon and critique the data management practice in their project

Competences

- Can navigate the demands and expectations of the research community as regards research data
- Can manage research data in line with the Danish Code of Conduct for Research Integrity, GDPR, as well as institutional and other policies
- Can reflect on, discuss and act upon issues pertaining to research ethics and responsible conduct with regard to research data

Contents

- Data documentation and data quality
- The Data Life Cycle
- The FAIR (Findable, Accessible, Interoperable and Reusable) principles and how to make data FAIR
- Data management planning
- GDPR as regards research data

Form

Classroom, discussion-based teaching (3 hours). Home assignment after the module.

Preparation

- Van den Eynden, Veerle, Louise Corti, Matthew Woollard, Libby Bishop and Laurence Horto. Managing and Sharing Research Data: Best practice for reserachers, 3rd Ed. University of Essex. 2011.

- Wilkinson, Mark D., Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg et al. "The FAIR Guiding Principles for scientific data management and stewardship." *Scientific Data* (3), 2016.

- SDU's Open Science Policy

Assignment

After the module, participants are required to either

1. Write a one page essay reflecting on the nature of data in their project and issues concerned with data in their project, or

2. Produce a data management/documentation plan for their project. Max. 3 pages.

Teachers

Evgenios Vlachos, associate professor, The Maersk Mc-Kinney Moller Institute, and research librarian, University Library of Southern Denmark

Heidi Maglekær Jensen, GDPR coordinator, TEK

Module 4: Publishing, authorship, and peer review

In this module participants will become aware and knowledgeable about key elements of scholarly publishing, authoring and peer reviewing.

Learning outcomes

Upon completion of the module, participants:

Knowledge and understanding

- Have a basic understanding of the publication process from submission to published research
- Are familiar with norms and conventions in publication processes and formats
- Understand the basis of proper ethical conduct when publishing and reviewing academic work

Skills

- Can engage in the publication cycle without committing intended or unintended research misconduct
- Can identify publication channels relevant for their own project
- Can handle academic publication in an ethically responsible way

Competences

- Can apply their awareness of both regular research misconduct and unintended rule-breaking
- Can engage in scholarly publication practices in an ethically responsible way, both as author, reviewer, and supervisor

Contents

An introduction to key elements in scholarship understood as the practice whereby participants and their fellow scholars produce and disseminate professional academic knowledge to advance the science of their discipline. This entails e.g. research integrity and ethics in publication activities, authorship, journal ranking, productivity/citation impact, and the peer review process.

Form

Classroom, discussion-based teaching (3 hours). Home assignment after the module.

Assignment

After the module, participants are required to submit a one-page essay describing their publication strategy, including their foremost concerns regarding ethically responsible

conduct in relation to publication of their project. The essay must take the course outcomes into consideration.

Preparation

- The Danish Code of Conduct for Research Integrity. Danish Ministry of Higher Education and Science. Nov 2014. (https://ufm.dk/publikationer/2014/the-danish-code-of-conduct-for-research-integrity)
- COPE website (http://publicationethics.org)

Teacher

Davide Giacalone, associate professor, SDU Innovation and Design Engineering, Department of Technology and Innovation