MF2071: Research Methodology in Mechatronics
4,5 credits

Course Memo 2016

Teaching Team

Didem Gürdür (Course Coordinator, Teacher)
dgurdur@kth.se, 08-790 7178

Göran Hamrin (Teacher)
ghamrin@kth.se

Fredrik Asplund (Teacher)
fasplund@kth.se

Martin Törngren (Examiner)
martint@kth.se

MANDATORY FOR TRACKS
Engineering Design program: Mechatronics track

CONDITIONALLY ELECTIVE FOR
Engineering Design program: Internal combustion engines track

FINAL GRADE SCALE
PASS/FAIL

COURSE DESCRIPTION
The course gives an increased and deepened knowledge in contemporary scientific and industrial development trends within the fields mechatronics and embedded control systems. Scientific methods are studied and to be able to work with both research ethics and research methodology, the fields are treated both at a general level and for the specific research specialization of mechatronics and embedded control systems. Scientific writing, review and presentation are included.

Furthermore, the course includes preparations for the second-cycle Degree Project, in literature studies, methodology and report writing.

Learning outcomes

On completion of the course, the student should be able to:

- Summarize and at a general level discuss important challenges and trends in the area of mechatronics and embedded control systems.
- Discuss and evaluate different scientific research methods.
- Evaluate, discuss and argue around research ethics.
- Write a scientific text within a specific field, related to the mechatronics and embedded control systems.
- Review and give constructive criticism on another student's scientific text.
- Choose information resources adequate for a specified need.
- Perform and adapt an iterative literature search in relation to a specified scientific research question.
- Write and present a planning report for a scientific study, for example a MSc thesis project.

Course requirements

- Participation on all other lectures and seminars. Students who miss one lecture or seminar will study the topic him/herself and submit a written report proving that the student understands the concepts.

- Literature search module, consisting of:

    - Online home assignment in literature search

    - Participation at two laboratory sessions in literature search

- One written final report, written by one or two persons

- Presentation at one of two seminars

Requirement of presentation and written report

- Content is of acceptable quality, from academic and scientific perspective. Content relates to the relevant literature.
- Focus on presentation and report is on (a) well-defined, elaborated research question(s), motivating the method to be used and describing the background literature.
- Sufficient number of relevant and acceptable references, relating to the subject, the study and the scientific contribution.
- The presentation and report should further include the results of the literature search, including choice of resources, results and a critical review of the results (see below).

Hints for documenting your literature search (to be included in final report)

The results of the literature search should be included in the report above, and constitute one A4 page. Describe how you thought when you were searching. How did you formulate your first search query? Why did you use those words? Also describe how your search logic evolved with time! Remember that you are to go through an iterative process where you:

1. come up with or find search words;
2. do a search;
3. evaluate the list of search results; and
4. revise your search logic and repeat the search.

Then you repeat this process sufficiently many times until the result is satisfactory. Do not forget that a search session almost always has to be iterative to be successful. This requires you to make structured modifications with additional terms, with revisions of search queries being done systematically in light of previous search results.

When reporting, try to answer the following questions. What new words did you find to improve your search? Did you use any thesaurus terms? How did you include the new words in your earlier search strings in order to retrieve more relevant material? How did you use the databases in order to meet your information need? You need to analyse your work using the concepts from the lectures and the material in the course.

In particular, you need describe and motivate your selection of papers. Here it is important that you provide an argument on which papers that you excluded from the reference list – are there any potentially relevant papers that you chose to exclude?

Literature, recommended reading

- The Rationality of Science (1981), Newton-Smith (available free online)
- Mixed methodology: Combining Qualitative and Quantitative Approaches (Applied Social Research Methods), Abbas Tashakkori, ISBN: 978-0761900719
- Research Design: Qualitative, Quantitative and Mixed Methods Approaches, Fourth Edition, by John W. Creswell, ISBN 978-1-4522-2610-1.
- For the Literature search module, online material on the Social -platform will be used.
- MSc thesis handbook, KTH Machine Design (available free online).

Time budget

The course awards 4,5 credits for the fall semester, totaling 120 hours of student work spent on the lectures, seminars, workshops and home assignments.

Relation between MF2071 and MSc Thesis projects in Mechatronics

Students who intend to perform a MSc thesis project in mechatronics are encouraged to use this project as a base for the tasks and assignments in MF2071. Students who do not intend to do this will either be able to use a MSc thesis project in another subject, or be assigned a MSc thesis project to work with for this course only.

- Students who have selected a MSc thesis project by Nov 10th will be able to use this as an example in this course
- Students who do not have a MSc thesis project by Nov 10th will be given a project to work with during this course.

Students who intend to perform a MSc thesis project in Mechatronics are strongly advised to start searching for MSc thesis projects **early** to be able to secure a project by Nov 10th.

Schedule and deadlines

The following schedule is valid at the start of the Autumn term 2016. Students will be notified of any changes / additional information via the MF2071 course homepage on KTH Social www.kth.se/social.

week	When	What	Where
35	Wedn, Aug 31, 10-12	MSc thesis process (MG, Damir) Ethics in research (MG) Course admin (DG)	M33
38	Fri, Sep 23, 10-12 + 13-15.	Scientific methods in MSc thesis projects (FA) Research methodology (FA)	M311
39	Wedn, Sep 28, 10-12	Presentation of MSc thesis projects in Mechatronics (supervisors)	M33 Project proposals available on social after this presentation
45	Mon, Nov 7, 12.30-13.15	START online homework assignment, for information search module	In Adobe connect, room: https://connect.sunet.se/kthbx/ (If you have never attended an Adobe Connect meeting before: Test your connection: https://connect.sunet.se/common/help/en/support/meeting_test.htm Get a quick overview: http://www.adobe.com/products/adobeconnect.html)
45	Mon, Nov 7, 12.30-13.15	Introduction to information search module	In Adobe connect, room: https://connect.sunet.se/kthbx/
45	Thu, Nov 10, 23.59	DEADLINE choice of MSc Thesis Project	Via email to dgurdur@kth.se
45	Sun, Nov 13, 23.59	DEADLINE online homework assignment, for information search module	Via email to ghamrin@kth.se
47	Nov 14 or 15, 13-16	Literature search laboratory 1 (KTHB)	Sign-up on social, choose one of the two time slots KTHB, room MAXWELL
47	Nov 21 or 23, 13-16	Literature search laboratory 2 (KTHB)	Sign-up on social, choose one of the two time slots KTHB, room MAXWELL Bring the 1A4 page draft version of the documentation in your planning report of your literature search with you to lab 2!
48	Mon, Nov 28, 08.15	DEADLINE Planning report	Via email to dgurdur@kth.se

48	Wed, Nov 30, 10-12	Seminar 1, student presentations	Q33 (presentation order randomly allocated on arrival)
49	Wed, Dec 7, 10-12	Seminar 2, student presentations	Q33