

Research Methods for RHD (REIT9000)

Course Coordinator: Prof Janet Wiles (j.wiles@uq.edu.au)

Course Description:

The course provides an overview of the fundamental research concepts and activities common to all research projects with a focus on engineering and science related topics. It enables RHD students to develop their understanding of: UQ's RHD policies and procedures; research methods; research ethics; data management; and research documentation and communication. The course gives students the necessary research skills essential to the systematic process of inquiry and to design and carry out original research to find relevant answers to the research questions raised in their academic study, and to present it convincingly both in written and oral forms.

The course aims to train RHD students in synthesising and critically reviewing scientific literature in order to formulate their research question(s). It also provides them with in-depth knowledge of different research methods to answer their research questions. The course aims at building the required skills to design a research project, choose and execute appropriate methods, assess research's intellectual and academic outcomes, and document and communicate the findings of their research to both technical and non-technical audiences.

The course begins with providing an overview of UQ's RHD policies and procedures (including milestones). The course teaches students to synthesize recent articles related to their project, and critically review the state of the art by analysing publications on the topic. The course then enables students to formulate their research questions and structure a plan for their research project. Finally, the course empowers students with the necessary tools to draft a paper that: defines research objectives; identifies current gaps in the topic based on the critical review; selects a proper research methodology; plan, implement and describe the research data collection, storage and analysis to support research verification and validation.

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

- Understand UQ's and school's RHD policies and procedures;
- Be familiar with research ethics, integrity and intellectual property;
- Understand a range of different scientific research designs and methods;
- Set up a scientific research study;
- Critically assess different research designs;
- Analyse, compare and review scientific literature;
- Discuss and explain differences between different research methods;
- Perform literature reviews and reference relevant scientific literature;
- Formulate a research plan;
- Apply course material to student's own research. Demonstrate this through participation in in-class discussions and activities, and in applying course concepts to class assignments.

Learning activities: Thursdays 12 noon-2pm

26 April	Module #1 Overview - RHD policies, procedures and services; Managing RHD candidature and milestones (Ben Matthews)
10 May (no session on 3 May)	Module #2 Fundamentals of scientific research (Janet Wiles); Literature synthesis & critical review
17 May	Module #3 Documentation of research findings (presenting) (Janet Wiles).
24 May	Module #4 Research project design; Research methods; Research data management plan; Research verification and validation (UQ Library)
31 May	Module #5 Documentation of research findings (writing) (David Rowland-tbc).
7 June	Module #6 Research ethics (Penny Sanderson-tbc) and IP (Janet Wiles, Mark Burdon-tbc)

Assessment

The following 3 assessments are specifically designed to help RHD students prepare for their RHD Confirmation Milestone (Confirmation report & Seminar):

- Literature review** (synthesis & critique): The purpose of this report is to become familiar with the style, structure and research methods associated with papers in the student's area of research and to demonstrate the ability to synthesize information from different papers and critique the presented approaches and methodologies. The goal of synthesis is to draw commonalities and differences out of related publications in an effort to establish technical gaps (research issues that have not been previously addressed), whereas the goal of the critique is to demonstrate your ability to suggest improvements (as a reviewer) or to extend the research presented (as a proposer).
The report must discuss at least 10 research articles in the student's area of research. The selected papers may be chosen in consultation with the student's advisory team.
(Up to 1000 words. Due date Monday 21st May)
- Presentation**: The purpose of this assignment is to help students improve their presentation skills by making an in-class individual presentation in which they will present their designed research project in a 15-minute technical presentation (conference style). Students will be responsible for making the slides for the presentation, and making sure that the material that they have compiled can be presented clearly within the allocated time. (Due Date swotvac week of 4-8 June, time TBA)
- Structured research plan**: The purpose of this assignment is to help RHD students to develop a project plan with key target dates for all milestones to ensure timely completion. Students will develop the project plan themselves but are required to acquire their principal advisor's input and approval. The project plan should include all major events and targeted dates for the program milestones as per UQ's procedure and after discussion with the advisor. It is the student's responsibility to make the necessary arrangements with their principal advisor to assist them with the development of the

project plan. The project plan must be signed by the student's principal advisor before submission.

The plan should comprise two parts: The first part should synthesize the relevant technical literature showing where gaps exist in current knowledge and technology. Where necessary, students should provide background information to help explain these gaps to a general technical audience (reviewers) in making the case that a research question or problem exists. It is expected that this first section will largely build upon the student's literature review report but will focus on a specific objective that they intend to pursue, i.e. the problem that the student plans to solve or question they plan to answer. The second part should focus on the proposed approach to the research problem or question, emphasizing how progress will be measured or determined, and why the proposed methods are feasible. In addition to addressing technical merit, students are also expected to address the timeline aspect of their research. (Up to 2500 words. Due date 18th June)

Passing the course is a condition of passing RHD confirmation.

To pass this course, RHD candidates need to:

- Attend ALL modules
- Submit ALL 3 assessment items
- Pass at least 2 (including the final presentation) of the 3 assessments.

Since the course is designed to be formative rather than summative all assessment will be graded on pass/fail basis.

Course offering

The course is offered twice a year in RQ2 and RQ4. RHD candidates should complete this course before their confirmation milestone: in months 7-12 of 1st year for PhD students; in months 4-6 of 1st year for M.Phil students; as follows:

1. RHD candidates commencing their RHD candidature in RQ1 & RQ2 should take the course in the 2nd offering (RQ4) of the year:
Start date: 4th week of October
End date: 1st week of December
2. RHD candidates commencing their RHD candidature in RQ3 & RQ4 should take the course in the 1st offering (RQ2) of the following year:
Start date: 3rd week of April
End date: 4th week of June

To Enrol: complete the Application for Enrolment in / cancellation of Additional Courses Form and send the fully endorsed form to rhdooffice@itee.uq.edu.au

Enquiries to: ITEE RHD Office – rhdooffice@itee.uq.edu.au