

CAS NS291: INTRODUCTION TO SCIENTIFIC RESEARCH

Fall 2010

SYLLABUS AND GUIDELINES

Course Description

CAS NS291 Introduction to Scientific Research Prereq: one year of a laboratory science course. For students enrolled in Boston University science study abroad programs. An introduction to the performance of scientific research through lectures, discussions and readings about the design of projects, the understanding of the scientific literature, and the ethics of research and publication. Local science faculty members will describe their research projects, and welcome students into their laboratories for approximately six weeks of practical research experience. *TBA* 2 cr. 1st sem.

Basis of the Syllabus

- Approximately eight weeks of weekly 90-minute class meetings with the course instructor and visiting faculty to explore library-based and electronic scientific literature, the approach to the design and execution of a research project as well as the ethics of research and publication, including the examination of case studies.
- Included in the class meetings will be presentations by local faculty, postdoctoral associates, and graduate students about the activities of their research groups, which the undergraduates will be welcome to join; students will be encouraged to visit the research facilities of those groups they are interested to join.
- A minimum of eight hours per week of practical research experience for approximately five weeks.
- One short paper on research interests among the local research activities. At least one paper (approximately 1,000 words in length) during the semester on issues raised in readings, discussions, and lectures.
- Final written report (approximately 1,000 words in length) about the research project undertaken, and a short (~15 min.) oral or poster presentation at an open research session.

Sources for Selected Readings and Discussions

- "Scientific Integrity: Text and Cases in Responsible Conduct of Research," F.L. Macrina, ASM Press, 2005. (ISBN-13: 978-1555813185)
- "An Introduction to Scientific Research," E.B. Wilson, Jr., Dover Publications, 1991. (ISBN-13: 978-0841209336)
- "Writing the Laboratory Notebook," H.M. Kanare, American Chemical Society, 1985. (ISBN-13: 978-0841209336)

Grade Assessment

- 20% based on attendance at the course sessions and participation in discussions as assessed by the course instructors.
- 40% based on assigned papers during the semester as assessed by the course instructors.
- 40% based on the quality of the research performance, the final written report, and oral/poster presentation as assessed by the research supervisor and course instructors.

Admission into the Course

A survey will be sent to prospective students, who are interested in taking NS291. The student will have to fill questions on his/her past experience in independent work (science fair projects, summer research activities, ...), possible future research directions and career interests. Applicants will be interviewed by the course instructor to be sure that they understand the commitments of time and effort of this optional elective course. Those selected will register for the course through the B.U. on-line drop-add procedure. The first meeting of NS291 will occur during the first week of formal classes of the semester.

Descriptions of Available Research

Visits of research facilities in Grenoble will be selected and organized according to student's preferential interests. At several classes in the first part of the semester, representatives (*e.g.*, faculty, post-doctoral associates, graduate students) from the research laboratories that will be available to the students for their practical experience, or the teacher responsible for the class will make short (~20 min.) presentations to the class about the nature of the work being performed. Students will meet with selected representatives outside of class and visit the research facilities.

Practical Research Experience

After the first month of classes, students will indicate to the course instructor the research laboratories available to them in which they would like to have their practical experience (in order of preference); assignments will then be made by the course instructor upon consultation with the research supervisors. Students and their supervisors will meet to discuss the research protocols, the bibliographic background, and the expected commitments of time and effort. At the end of the semester, the student will submit a final written report (~1,000 words in length) about the research project, and a poster presentation (or short (~15 min.) oral presentation) at an open session.

Syllabus

Week	Topics	Sources for Selected Readings and Discussions
1 (02/09)	Presentation of the chemistry and biology research going on in Grenoble	
2 (02/09)	Choosing a research problem; searching the literature	Wilson, Chaps. 1, 2
3 (08/09)	The scientific method; keeping a research notebook	Wilson, Chap. 3 Kanare, Chap. 1, 2
4 (15/09)	Scientific recordkeeping	Kanare, Chap. 5 Macrina, Chap. 11
5 (22/09)	Ethics, scientific research and the notebook	Macrina, Chaps. 1, 2 Kanare, Chap. 3
6 (29/09)	The mentor-trainee relationship; description of available research	Macrina, Chap. 3
7 (06/10)	Use of humans in biomedical experimentation; description of available research	Macrina, Chap. 5
8 (13/10)	Use of animals in biomedical experimentation; description of available research	Macrina, Chap. 6
9 (W 44)	Practical research experience	
10 (W 45)	Practical research experience	
11 (W 46)	Practical research experience	
12 (W 47)	Practical research experience	
13 (W 48)	Practical research experience	
14 (W 49)	Final written report, oral/poster presentation	