CAS NS291: INTRODUCTION TO SCIENTIFIC RESEARCH

Boston University Dresden Science Program

SYLLABUS AND GUIDELINES

Course Designator:	**CAS NS291**
Title:	**Introduction to Scientific Research**
Time:	**once a week at 90 minutes**
Instructors:	**Prof. Dr. Andreas Deußen et al.**
Lab Visits:	**according to appointments**

Course Description

This course is set up for students enrolled in Boston University Study Abroad Science programs. This course is an introduction to 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 during lab visits. Students are to work in groups on the preparation of these lab visits. Each student will identify research questions he/she wants to address during the subsequent student labs. Each student will prepare an abstract and a poster of his/her choice related to the lab that will be attended. Students will obtain first experience as review peers by evaluating the course work of their fellow students. Following the lab course(s) students will analyse their experimental data and relate this analysis to their previous research question/hypothesis. Subsequently, they will revise their abstracts and posters and enhance them with results obtained in the experiments. The data collected, data analysis, the abstract and poster as well as an oral poster presentation to the group will be graded by the course instructors.

Language of Instruction: English, 2 credits.

Basis of the Syllabus

- Approximately 8 weeks of weekly 90 to 120-minute class meetings with the course instructors and visiting faculty to explore library-based and electronic scientific literature, the approach to the design and execution of a research project, and the ethics of research and publication.
- Attendance of student labs and lab visits of local faculty.
- Structured data collection and analysis from the experiments done.
- One abstract and poster preparation as well as oral presentation in preparation of the experiment(s) to be undertaken during the student lab. One final abstract and poster submission as well as poster presentation including the results from the experiment(s) undertaken in the lab.

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)
- and other texts provided by the course instructors

Grade Assessment

- 20% based on attendance at the course sessions and participation in discussions
- 20% based on work assigned during the course and as assessed by fellow students and the course instructors
- 60% based on the quality of the data collection, abstract, poster and oral presentation (each 15%) delivered at the final student presentation at course end as assessed by the course instructors

Admission into the Course

Capacity of the course is limited to a maximum of 10 students. Interested students are invited to submit information on a structured questionnaire which is used for applicant ranking by the course instructors. Priority of course admission is given according to applicant ranking.

Lab Visits

During the first class session students will receive the schedule and instructions for the laboratory visits. Experiments to be selected are from the field of cellular or integrative cardiovascular physiology. It is expected that students attend at least 2 lab visits. Further lab visits may be arranged with course instructors. Students will do research on at least one topic offered in the student lab. Students will use the lab visits to experimentally test their research question(s) or hypotheses. Students will analyze their experiments and implement the results in their course work.
At the end of the semester, the students will submit their data acquisition and analysis, an abstract and a poster for evaluation by the course instructors. Furthermore, they will give a short (~ 15 min.) group poster presentation including a discussion with fellow students and faculty.

Preparation

I. a minimum of 1 hour for each class meeting.

II. a minimum of a full working day for preparation and analysis of each lab experiment.

III. Written assignments (homework) must be legible, neat, and submitted on time.
Only in cases of illness or unforeseen circumstances will late work be accepted.

IV. Lab experiments may use animal tissues. Thus, for ethical reasons a detailed preparation of each student is expected to optimize success rates of experiments. Furthermore, experiments are cost intensive which also requires excellent lab preparation. Missing adequate preparation or sloppiness related to lab work may lead to immediate course exclusion.

Chronology

Week	Topics	Instructors
1	Course introduction, course expectations Theory: What is science? Structuring research (aim/hypothesis, methods, results, discussion/summary/conclusion, project documentation, publishing, research resources, ethical issues) Course structure, theory seminars, practical (lab) courses Exercises to be done, final presentations and course assessment	Deussen, Das, Parshyna, Dieterich, Kopaliani
2	Documentation, keeping a lab book Structure of scientific communications, data, figures, tables, indexing literature, citing literature, copy rights Topics of lab exercises, how to gain information Home work: Find your favourite course (lab) topic, review relevant course literature and create a presentation to the group (5 min)	Das, Parshyna
3	Presenting the favourite course topic Presentation by each student, discussion by group Theory: structure of scientific abstracts, abstract preparation Home work: write an abstract for your favorite lab topic	Das,Parshyna/ Dieterich, Kopaliani
4	Abstract, reading and evaluation of written abstracts Peer review by group Theory: structure of scientific posters, poster presentation Homework: preparing a poster for your favorite lab topic	Dieterich, Kopaliani
5	Presenting the poster (presentation by each student) Peer review by group Wrap up of course theory, open questions	Dieterich, Kopaliani

Week	Topics	Instructors
6	Lab course I (rotations, 3 groups, each 3-4 students)	Das, Dieterich, Kopaliani
7	Lab course II (rotations, 3 groups, each 3-4 students)	Das, Dieterich, Kopaliani
8	Final presentations by students, poster discussion (course assessment)	Deussen, Das, Dieterich, Kopaliani, Parshyna