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Course Description:
What is science? What is the scientific method? How is science conducted? Does this process work? In this course we will examine the history of science and how researchers conduct science today. We will be using the field of stem cell research to frame our examination of the scientific process.

Class time:
Lectures: Tuesdays and Fridays, 3:30pm - 4:20pm in MDCL 1305
Tutorials: Weekly mandatory tutorials (1 hour and 50 minutes long). Please check your schedule for the time and location.

Required Texts & Materials:
There is not required text for this course. The course outline, assignments, lecture notes (PDFs), notices and other materials will be posted on the course website (http://avenue.mcmaster.ca/). Please make sure you check the course website frequently!

Course Aims:
- Engage in scientific discourse
- Confront preconceptions and draw conclusions based upon scientific research
- Critically analyze published data
- Thoughtfully and civilly engage in evidence-based arguments
- Examine career fields within the Life Sciences

Course Objectives:
By the end of this course, students should be able to:
- Critically read research papers
- Present and describe research data and interpretations in an oral and written format
- Postulate hypotheses, predictions and experiments to test them
- Analyze and interpret experimental results

Format:
This course consists of two 50 minute lectures and one 1 hour and 50 minute tutorial each week. In the tutorial, lecture material, new material, and assignments will be addressed. Therefore, the tutorials
represent an integral part of the course work and are mandatory. Within the tutorial, grades will be assigned for participation, presentations and written reports. Each tutorial (excluding those used for Assignment 1- part 1, Assignment 2, and tests) will end with a short quiz. Please bring a laptop to every tutorial. If this is a problem, contact us immediately.

**Evaluation:**

<table>
<thead>
<tr>
<th>Assessments</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Tutorials</td>
<td>18%</td>
</tr>
<tr>
<td>T1-T7</td>
<td>(3% each, top 6/7 counted)</td>
</tr>
<tr>
<td>Assignments 1: Data Analysis Project (individual)</td>
<td>18%</td>
</tr>
<tr>
<td>Assignment 2: Oral Presentation (group)</td>
<td>14%</td>
</tr>
<tr>
<td>Tests (individual)</td>
<td>50%</td>
</tr>
<tr>
<td>Test 1 (multiple choice, short answer)</td>
<td>(See grade breakdown below)</td>
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<tr>
<td>Test 2 (multiple choice, short answer)</td>
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**Tutorials:**
Each tutorial is valued at 3%. Your top 6/7 grades will be used to calculate your tutorial grade; however, you must still attend all tutorials.

**Assignment 1: Critical Research Appraisal of Data in Primary Research**
It consists of a two part data analysis project (individual) of two primary research articles. Part 1 will be due at the beginning of the tutorial and it will be peer reviewed before being submitted to TAs for marking. Part 2 will be submitted on Avenue and graded by TAs.

**Assignment 2: Oral Presentations**
It consists of student oral presentations (in pairs) of a primary research article evaluated in tutorial by TAs and peers. Students will also submit a one page handout and a printout of the oral presentation to the TAs for evaluation.

**Test 1:**
Part 1: Multiple-choice test in class (Week 6) that evaluates knowledge-based skills and concepts.
Part 2: Written, short-answer assignment in tutorial (Week 7) and graded by grading TAs. **BRING YOUR LAPTOP TO THE TUTORIAL FOR THE TEST**

**Test 2:**
Part 1: Multiple-choice test in class (Week 12) that evaluates knowledge-based skills and concepts.
Part 2: Written, short-answer assignment in tutorial (Week 11) and graded by grading TAs. **BRING YOUR LAPTOP TO THE TUTORIAL FOR THE TEST**

If you do not submit an MSAF and write both parts (MC and SA) of test 1 or 2 during your normally scheduled time, the individual test grade and overall test grade will be calculated as follows:

**Individual Test Grade (test 1 or 2)**
Scheme A: MC = 40% and SA = 60%
Scheme B: MC = 60% and SA = 40%
Individual Test Grade: the greater of scheme A and B
Overall Test Grade (50% of final mark)
Scheme A: Test 1 = 40% and test 2 = 60%
Scheme B: Test 1 = 60% and test 2 = 40%
Overall Test Grade: the greater of scheme A and B

Tentative Schedule:
Any changes to the tentative schedule below will be posted on Avenue to Learn.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>LECTURE TOPIC</th>
<th>TUTORIAL TOPIC</th>
<th>ASSIGNMENTS</th>
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</thead>
<tbody>
<tr>
<td>I (Sept 5)</td>
<td>Introduction to course</td>
<td>No tutorials</td>
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<td></td>
<td>Introduction to Science and the Scientific Method</td>
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<tr>
<td>II (Sept 11)</td>
<td>Introduction to the Scientific Method</td>
<td>The Scientific Method - Part I: The Black Box</td>
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<td></td>
<td>Studies of Regeneration</td>
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<tr>
<td>III (Sept 18)</td>
<td>Planaria as a model system</td>
<td>The Scientific Method - Part II: Experimental Design - The Tea Lady</td>
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<tr>
<td>IV (Sept 25)</td>
<td>Science Literacy – Part I: How to access scientific information</td>
<td>The Scientific Method – Part III: Regeneration and aging (N. Rosenthal)</td>
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<td>Stem cells (ESCs and ASCs)</td>
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<td>V (Oct 2)</td>
<td>Science Literacy – Part II: Peer review in the scientific literature and how to effectively peer review</td>
<td>Science communication</td>
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<td>Stem cells (ESCs and ASCs)</td>
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<td>Oct 9-15</td>
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<td>Midterm recess</td>
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<tr>
<td>VI (Oct 16)</td>
<td>Review</td>
<td>Peer review and providing constructive feedback</td>
<td>Assign. 1: Data analysis project - Part 1 (due at the beginning of tutorial)</td>
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<td>Test #1 - Part 1 (Friday Oct 20th 3:30-4:20pm)</td>
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<tr>
<td>VII (Oct 23)</td>
<td>Science Literacy – Part III: How to communicate scientific information</td>
<td>Test #1 - Part 2</td>
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<td></td>
<td>Stem cell niche</td>
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<tr>
<td>VIII (Oct 30)</td>
<td>Stem cell niche</td>
<td>Research ethics and publication</td>
<td>Assign. 1: Data analysis project - Part 2 (due Fri Nov 3 at 11:59PM - Avenue)</td>
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<td>Induced Pluripotent Stem Cells (iPSCs)</td>
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<tr>
<td>IX (Nov 6)</td>
<td>Induced Pluripotent Stem Cells (iPSCs)</td>
<td>Oral Presentations</td>
<td>Assign. 2: Presentations</td>
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<td></td>
<td>Trans-differentiation</td>
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<tr>
<td>X (Nov 13)</td>
<td>Stem cells and aging</td>
<td>Oral Presentations</td>
<td>Assign. 2: Presentations</td>
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<tr>
<td></td>
<td>Stem cells and cancer</td>
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<tr>
<td>XI (Nov 20)</td>
<td>Guest lecturer from Dr. Kristin Hope lab (SCC-RI) Review</td>
<td>Test #2 - Part 2</td>
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<tr>
<td>XII (Nov 27)</td>
<td>Test #2 - Part 1 (Tuesday Nov 28th 3:30-4:20 pm)</td>
<td>E-Portfolio on PebblePad</td>
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<tr>
<td>XIII (Dec 4)</td>
<td>Dec 5th Deferred tests</td>
<td>No tutorials</td>
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Absences & Missed Work - Life Sci 2A03 Flexible Grading and MSAF Policy

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

If you are absent from the university for a minor medical reason, lasting up to 3 calendar days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form (MSAF). When using the MSAF, report your absence to LS2A03@mcmaster.ca immediately after using the online tool (normally within 2 working days) in regards to the nature of the relief. Failure to do so may negate the opportunity for relief. The instructor/instructional assistant will indicate what relief may be granted for the work you have missed (see details below). Absences for a longer duration or for other reasons must be reported to your Faculty office, with documentation, and relief from term work may not necessarily be granted.

We recognize that the use and reliance on the MSAF by students is closely tied with both stress and time management. With that in mind, we have developed a flexible grading scheme to help you plan and manage both stress and time. This reflects our commitment to McMaster’s Forward with Flexibility, which ‘aims to enhance accessibility and to equitably meet the learning needs of a diverse student body’.

Tests
If you submit an MSAF for any of the parts of either test (test 1 MC or SA, test 2 MC or SA), you will write a cumulative make up test at the end of the semester (week 13) that consists of MC and SA questions. You are not permitted to defer this deferred test. This make up test will count as the portion of the test you missed and be used to calculate your individual and overall test grades as follows:

**Individual test grade**
Individual Test Grade: Make up test grade = 50%, previously completed MC or SA portion = 50%

**Overall test grade**
Overall test grade: Test 1 = 50% and test 2 = 50%

Tutorials
Each tutorial (excluding group presentations and data analysis project) is valued at 3%. Your top 6/7 grades will be used to calculate your tutorial grade, however, you must still attend all tutorials. If you submit an MSAF for tutorial work, there will be no additional relief for missed work, since the tutorial grade will be determined using your top 6/7 grades (if you submit an MSAF for a tutorial, it will count as your lowest grade and the other 6 tutorial grades will be used to calculated the final tutorial grade).
Assignments
If you submit an MSAF for assignment 1 (part 1), there will be no additional relief as mentioned above because it is part of the 3% tutorial grade. Students who submit assignment 1 (part 2) on time will receive both feedback and a grade. You may submit your assignment 1 (part 2) up to 7 days late with no late mark applied. You will still receive a grade, but there will be no feedback. No additional accommodations will be provided beyond the 7-day extension for Assignment 1 (part 2). An MSAF is required if you miss the oral presentation for Assignment 2, and you will need to arrange a time to present with the TA. The group will still be expected to present even if one of the members is absent.

Checking Your Grades:
All grade concerns and discrepancies must be reported to the Instructional Assistant (tutorial and assignment grades) or Dr. Rodriguez Moncalvo (MC tests) within a week of receiving the grade.

Re-mark Policy:
Requests for re-evaluation of tests or assignments must be made in writing to the Instructional Assistant or Dr. Rodriguez Moncalvo within one week of return of the marked term test or assignment. Please be aware that an approval for a remark can result in an increase, decrease or no change to the original mark.

Communication between Students and Faculty:
The University’s official method of correspondence with students is through a valid McMaster University e-mail account. It is the student’s responsibility to keep his/her @mcmaster.ca account active and check it on a regular basis. All emails from students must include your full name and course code. Emails will be replied to within 72 hours.

Student Responsibilities:
To get the most out of the course, you must be prepared to:
- attend all sessions, make up all missed work, and provide documentation for authorized absences;
- interact frequently with faculty, students, TAs, and other support staff;
- plan and manage your own time;
- complete preparatory tasks (such as reading, writing assignments, and initial research) in advance of sessions;
- develop and use reflective learning skills (for example identifying learning objectives, planning and carrying out research tasks, acting on academic feedback);
- work as an effective, efficient, and responsive team member on group assignments;
- follow all the guidelines as outlined in the Introduction section of the Laboratory Manual;
- check the course Avenue site, and your McMaster and Avenue e-mail daily for updates; and,
- follow all university policies and guidelines, and in all ways be a responsible university member.
Senate Student Policies

Students can view full policies here (http://www.mcmaster.ca/policy/Students-AcademicStudies/).

Senate Policy Statements are also available from the Senate Secretariat Office, Room 104, and Gilmour Hall.


Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty.

The following illustrate only four of many forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained;
- copying or using unauthorized aids in laboratory exercises
- improper collaboration in group work; and
- copying or using unauthorized aids in quizzes, tests and examinations

All students are reminded of the importance of academic integrity, and the serious consequences of academic dishonesty.


You acknowledge that your behavior in all aspects of this course should meet the standards of the McMaster University Student Code of Conduct. You understand that any inappropriate behavior directed against any of your colleagues, teaching assistants, or the instructional team will not be tolerated. Disruptive behavior during any session (e.g. lecture, seminar, lab, tutorial) such as talking, sleeping or non-class computing while an individual presents information, or constantly being late, will also not be tolerated. Abuse, ridicule, slander, inappropriate language, and discrimination towards instructors teaching staff, teaching assistants and other students will not be tolerated in any capacity. Shared spaces including e-spaces such as the Avenue to Learn course discussion board are to be considered inclusive and safe.

Plagiarism Detection

In this course, we will be using a web-based service (Turnitin.com) to reveal plagiarism. Students will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to www.mcmaster.ca/academicintegrity).

Copyright Policy
In this course you will have access to material that is subject to copyright laws. This includes (but is not limited to) textbooks and all resources developed by the instructors such as lab manuals, demonstration videos, quizzes, assignments, tests, class notes and class slides. Under no circumstance are you allowed to share or redistribute this material in any printed or electronic form without the explicit written consent of the copyright holder. This includes posting any course material on Internet bulletin boards, course repositories, social networks, etc.

The instructors and the university reserve the right to alter this outline if necessary.

The instructors and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.