

School of Interdisciplinary Science

COURSE OUTLINE ISCI 1A24 2019-2020

INSTRUCTORS:

Name	Component & Projects	Email	Room	
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COURSE DESCRIPTION:

ISCI 1A24 is a 24-credit course open only to students registered in the Honours Integrated Science program.

The course aims to

- provide you with a wide-ranging background of core concepts in the areas of mathematics, physics, chemistry, life science, Earth sciences, and science literacy, appropriate to the continuation of study in those areas in level two courses;
- illustrate the interconnectedness of the scientific disciplines, drawing on examples from topics of current public interest;
- equip you with a wide range of scientific, problem-solving, critical thinking, and collaborative skills;
- nurture a creative, student-oriented, distinctive learning environment in which you can begin to develop your academic identities, scientific interests, research, and professional development skills within our community of students, staff, and faculty.

Program Website: http://www.science.mcmaster.ca/isci/

Avenue to Learn site: <u>http://avenue.mcmaster.ca/</u>

LEARNING OBJECTIVES:

Throughout the course, you will be developing a range of skills including: research skills, team work, leadership, communication skills, fieldwork skills, information literacy, experimental design, critical thinking, data analysis, numeracy, and math literacy. The learning objectives for each component are:

Life Science (LifeSci)

The goal of the life science component of ISCI 1A24 is to generate understanding in how the scientific process pertains to our knowledge of biological systems. You will develop conceptual understanding of biology and some psychology through discussion of theory and hands-on laboratory practice. After completion of ISCI 1A24, you will begin to understand the evolution of biological concepts spanning cellular to ecosystem level perspectives and apply synthesis across scientific disciplines to address questions relevant to society.

Chemistry

The objectives for chemistry in ISCI 1A24 are to discuss and understand chemical concepts, theories and examples of fundamental chemistry. You will develop skills needed to solve chemical problems and gain experience in the experiment-driven investigation of chemical questions. You will apply chemical concepts to current issues within the themes of health, energy, the environment and chemical biology, and demonstrate how your chemistry skills can be used to undertake interdisciplinary problems.

Physics

The physics portion of ISCI 1A24 covers Newtonian mechanics including Newton's laws of motion, gravity, conservation laws, fluids, and harmonic motion; light and interference phenomena; and the basics of quantum mechanics and atomic structure. You should be able to bring your knowledge and acquired skills in physics to bear on interdisciplinary problems.

Mathematics

The math portion of ISCI 1A24 is designed to develop a conceptual understanding of the fundamental principles of calculus and explore their relevance to other branches of natural sciences. It covers standard topics in Calculus I & II: differential and integral calculus of functions of one variable, differential calculus of functions of several variables, sequences and infinite series; as well as polar coordinates and parametric curves, applications of calculus to probabilities and statistics, and an introduction to differential equations. Emphasis is placed both on the theoretical foundation and the practical integration of these mathematical concepts and principles with knowledge and skills from biology, chemistry, physics, earth science and psychology in the context of four major interdisciplinary research projects: RP1/2/3/4.

Earth Science

The Earth science portion of ISCI 1A24 will provide an introduction to the many dynamic geological and geomorphological processes that shape the Earth and its surface and subsurface environments. These processes will be discussed using both local and global applications. You will be required to participate in a mandatory field trip for this component of ISCI 1A24.

Science Literacy (SciLit)

The science literacy portion of ISCI 1A24 will introduce students to oral and written forms used to communicate science to scientists and non-scientists. Through weekly exercises, students will develop the ability to convey scientific data and concepts clearly and concisely. Students will also become familiar with a variety of information sources, and how to find and use that information effectively.

COURSE SCHEDULE:

Dates	Activities				
September 3 – October 11	Basic Training including RP0 ("Research Project Zero")				
October 12 – 20	Mid-term Recess				
October 21 – November 8	RP1: Planetary Exploration				
November 11 – 29	RP2: Drugs, Doses and Biodistribution				
December 2 – 4	Review				
December 6 – 19	Exams				
January 6 – February 14	RP3: Sustainable Energy in Challenging Environments				
February 15 – 23	Mid-term Recess				
February 24 – April 3	RP4: Cancer – A Mammalian Plague				
April 6 – 7	Review				
April 13 – 28	Exams				

CLASS ACTIVITIES:

The weekly course timetable will be posted on Avenue. *The course calendar (a Google Calendar) on Avenue will supersede all other calendars including MOSAIC.* Any schedule changes will be announced on Avenue.

Check the Avenue course site daily.

You must be prepared to be present at all of the times indicated for iSci classes, including iConS, invited speaker seminars, labs & tutorials.

Format

There will be twenty-four hours of supervised time per week (not including some field trips and exams). Attendance is mandatory for all supervised time. During the first six weeks of the course, the focus will be on background concepts and basic skills. For the rest of the course, many activities will be directly related to Research Project work. The types of activities are:

iConS: (Integrated Concept Seminars): Class activities led by an instructional team member. These will focus on core disciplinary knowledge, scientific techniques and interdisciplinary topics. They will usually contain activities and discussion. Your understanding of content presented in iConS will be assessed via exams, continuous assessment, and/or project work.

Project iConS: When working on Research Projects, progress will be monitored and guided during these sessions. Faculty will often be available for "Q&A" sessions.

SciLit (Science Literacy): The focus during the weekly Sci Lit sessions will be developing research and communication skills needed for current and future course work.

Labs: Each week, approximately six hours will be spent in laboratories and workshops, including field excursions, computer labs and research project labs.

Workshops: An activity or exercise that you do in any discipline area that does not appear in the lab manual and does not involve lab notes. Workshops may include in class work on computers or problem

sets. Workshops do NOT include any work done on computers that would be considered experimental (e.g. simulations). There may be assignments associated with workshops.

Invited Speaker Seminars: During the Research Projects, speakers will be invited to widen your understanding of key issues. At other times, the one-hour Invited Speaker Seminar slot will be used for review periods and additional teaching.

OFFICE HOURS:

Instructors and Teaching Assistants will hold office hours and communicate via Avenue when and where these take place.

REQUIRED TEXTS & MATERIALS:

The following items can all be purchased at the Campus Store.

Math (required)

ETEXT: Webassign for Stewart's *Calculus Early Transcendentals*. ISBN-13: 9781337771504 (This is a multiterm access code and it is available at the Campus bookstore for CAD 99.00) **Note: this ETEXT will be used in ISCI 2A18 next year.**

Math (optional/alternative)

PKG: Calculus Early Trancendentals, SSM Single Variable/Multivariable And Enhanced Webassign (Life Of Ed.) ISBN-13: 9780176887155

(In addition to the required ETEXT, this package contains the printed textbook and 2 student solution manuals. The package is available at the Campus bookstore for CAD 169.00)

Physics (required)

R.A. Serway and J.W. Jewett, *Physics Scientists/Engineers with Modern Physics*, 10th Edition, ISBN: 9781337699297 (electronic textbook and Webassign from the bookstore).

Chemistry (required text book and required online access)

R.H. Petrucci, F. G. Herring, J.D. Madura and C Bissonnette, *General Chemistry: Principles and Modern Applications*, 11th Edition (Pearson, 2017)

The web based *Mastering Chemistry* learning tool is required.

The *General Chemistry with Modified Mastering & Selected Solutions RVP Edition 2* (ISBN10: 1-323-48080-3, ISBN13: 978-1-323-48080-9) package includes:

- 1. General Chemistry for McMaster University (Petrucci)
- 2. Modified *Mastering* with e-text Standalone Access Card for General Chemistry 11e (Petrucci)
- 3. Selected Solutions Manual for General Chemistry 11e (Petrucci)
- 4. General Chemistry Insert

If you choose to purchase a used text the on-line access to *Mastering Chemistry* is NOT included. You can buy access to *Mastering Chemistry* directly through the publisher's website at masteringchemistry.com.

Life Science (recommended for reference, any Edition or Version of the following)

Freeman, S., M. Harrington & J. Sharp. *Biological Science (Vol 1).* Custom text to McMaster. Pearson Education Canada. ISBN: 9780132496537. (Includes Short Guide)

Freeman, S., M. Harrington & J. Sharp. *Biological Science (Vol 2).* Custom text to McMaster. Pearson Education Canada. ISBN: 9780132496544. (Includes Short Guide)

Note: Vols. 1 & 2 can be purchased together. Both volumes (1 & 2) will be referenced. ISBN for both volumes together: 9781256859468.

Morris, J., D. Hartl, A. Knoll & R. Lue. *Biology: How Life Works*. W.H. Freeman & Co. ISBN: 9781429218702. Any additional introductory biology texts can be accessed by the student for conceptual understanding.

Earth Science (recommended – copies available in iStudy)

Plummer, C., Carlson, D., McGeary, D., Eyles, C., & Eyles, N. *Physical Geology & the Environment, 2nd Ed.* McGraw-Hill Ryerson. ISBN: 978-0070956339

Other Required Materials

i>Clicker (required) Electronic audience response system. ISBN: 9780716779391

Lab coat and safety goggles (required)

Lab notebook (required) Student Lab Notebook with carbonless duplication (Hayden-McNeil, Spiral Bound) ISBN: 978-1-930882-74-4 [it has "Chemistry" printed on the front page; price is about \$24.75] Field notebook (required) Field Book, Orange, 8x4 (ELAN) [price is about \$12.95] Calculator (required) Casio fx-991 MS Plus ONLY Permanent marker (for lab activities)

Mandatory Safety Training

Before entering the laboratories, you <u>must</u> complete two laboratory safety courses:

- WHMIS 1A00
- BIOSAFE 1BS0

These courses can be accessed via Avenue to Learn.

ASSESSMENT:

ISCI 1A24 will be assessed across six components (mathematics, physics, chemistry, life science, Earth science, and science literacy) through three formats: exams, continuous assessment, and research projects.

Mid-term and final *exams* will assess your core knowledge with discipline-specific content containing questions similar to other level one course exams. Further "synoptic" exams will test interdisciplinary conceptual problems and synthesis.

Discipline-specific continuous assessments will include laboratory work, exercises, preparatory tasks, and general "homework" and quizzes. Most work will be graded individually, but there may be some group assignments.

Research Projects will contain varied assessed deliverables, which demonstrate, not only scientific skills, but also additional research, collaborative authorship, project management, peer review, and communication skills. Most work will be compiled and graded as group work. There will be some individual assignments.

This course is worth 24 credits. The table below shows how the ISCI 1A24 course mark will be assembled.

		ACTIVITY										
		Exams		Continuous	Projects							
		Exam Breakdown Midterm:Final etc,	Discipline Exams	Synoptic Exams Weighting: 5:5	Activities & weights at instructor's discretion	RPO	RP1 Planetary Exploration	RP2 Drugs	RP3 Energy	RP4 Cancer	Projects Total	TOTAL
COMPONENT	Math	4:4:7 4:4:7	30	2	20	0	5	5	10	8	28	80
	Physics	6:9 6:9	30	2	20	0	6	4	10	8	28	80
	Chemistry	4:4:7 4:4:7	30	2	20	*	5	5	9	9	28	80
	Life Science	6:8 6:10	30	2	20	*	4	4	8	12	28	80
	Earth Science	2:3 3:2	10	2	10	2	3	2	8	3	18	40
	Science Literacy	No exams	0	0	12	2	4	3	9	10	28	40
	TOTAL			140	102						158	400

* RPO assessment for Chemistry and Life Science are included in component continuous marks.

PASS-FAIL CRITERIA BY COMPONENT

Passing ISCI 1A24 requires attaining a grade of 50% or higher in the course as a whole. Passing ISCI 1A24 also requires passing all components as described below. In addition, no more than two core laboratories, per component, per year, may be missed. If more than two core labs are missed, the student will fail that component.

Mathematics

A student will pass the math component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Gains at least 15 points (out of 30 available) in the exam element of the math component
- Gains at least 40 points (out of 80 available) in the component overall

Physics

A student will pass the physics component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Gains at least 15 points (out of 30 available) in the exam element of the physics component
- Gains at least 40 points (out of 80 available) in the component overall

• Attends and completes the core physics laboratories

Chemistry

A student will pass the chemistry component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Gains at least 15 points (out of 30 available) in the exam element of the chemistry component
- Gains at least 40 points (out of 80 available) in the component overall
- Attends and completes the core chemistry laboratories

Life Science

A student will pass the life science component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Gains at least 15 points (out of 30 available) in the exam element of the life science component
- Gains at least 40 points (out of 80 available) in the component overall
- Attends and completes the core life sci laboratories

Earth Science

A student will pass the Earth science component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Gains at least 5 points (out of 10 available) in the exam element of the Earth science component
- Gains at least 20 points (out of 40 available) in the component overall
- Attends and completes the core Earth sci laboratories

Science Literacy

A student will pass the science literacy component of ISCI 1A24 only if they satisfy <u>all</u> the following criteria:

- Attends class (persistent absence from SciLit classes will result in failure of the component).
- Completes at least 4 blog posts during the year.
- Gains at least 20 points (out of 40 available) in the component

There may be opportunities to make up failed component content over the summer by enrolling in specified courses (unit value may be higher than the iSci component). It will be left to the discretion of the instructor and iSci Program Coordinator to determine the content that needs to be made up. If you fail more than 2 components of ISCI 1A24, you will not be permitted to enroll in ISCI 2A18 (no make up will be possible).

ABSENCES & MISSED WORK:

If you are absent from the university for a minor medical or personal reason, lasting up to 3 calendar days, you may report your absence, <u>once per term</u>, without documentation, using the McMaster Student Absence Form (MSAF). MSAF is available in the online MOSAIC Student Center (in the drop down menu under Academics). Absences of a longer duration (>3 days), and/or for work worth more than 25% of the final grade, and/or if you have already submitted an MSAF request for the term, must be reported to the Office of the Associate Dean of Science (BSB 129), <u>with documentation</u>, and relief from term work may not necessarily be granted. When using the MSAF, you MUST use <u>la24msaf@mcmaster.ca</u> as the contact e-mail for your ISCI 1A24 work. You MUST ALSO contact the relevant component lead or laboratory coordinator (depending on what you missed) within 48 hours by email. If you do not, your MSAF may not be granted. Please refer to the contact list on the first page of this outline for appropriate email addresses. Your component lead or laboratory coordinator will indicate what relief may be granted for the work you have missed, and relevant details such as revised deadlines, or time and location of a make-up exam/quiz/test. An MSAF is a request for *individual* consideration: understand that an instructor may respond with an *individual* solution. Please note that the MSAF may not be used for final project

deliverables, deliverables worth more than 25% of the final grade, nor can it be used for a final examination or its equivalent.

Absence from iConS, Tutorials or Workshops: If you are absent from any scheduled ISCI 1A24 session, it is your responsibility to make up missed work. If you are absent from a scheduled ISCI 1A24 session that has an associated piece of assessment (e.g. test, quiz, presentation, etc.) without authorization your mark will be recorded as 0 (see procedure for authorized absence above).

Absence from Invited Speaker Seminars: Unless approval for missing an Invited Speaker Seminar is obtained (see procedure for authorized absence above) your project mark associated with the Invited Speaker Seminar could be reduced by 20%. Attendance will be taken at all Invited Speaker Seminars.

Absence from Laboratory: Students unable to attend a laboratory due to illness or other personal situation should complete a McMaster Student Absence Form (MSAF). Please refer to procedure for authorized absence above.

If a lab is missed with a MSAF submission, the mark for that lab will be redistributed as appropriate or a make-up opportunity will be undertaken *if possible*.

Any unauthorized absences (i.e. no MSAF submission) will result in a mark of 0 for that lab. Any unauthorized absences from project labs will result in a 50% reduction of the total project mark.

If more than 2 labs PER DISCIPLINE PER YEAR are missed, irrespective of MSAF submission, the student will fail that core component of ISCI 1A24 AND THUS FAIL THE ENTIRE COURSE.

Students are expected to arrive to their scheduled laboratory time slot at least 5 minutes before the lab begins. <u>The door will be locked once the lab starts</u>. Students who arrive late to the lab will be turned away and the lab will be subject to a mark of 0 and count as a missed lab.

Missed deadlines

Any late submissions will result in a penalty of **20% per day** *unless* faculty members are notified of any problems <u>in advance and approve</u> of a late submission. It is left to the discretion of the instructor to determine if accommodations will be made. This holds for both group and individual assignments.

Missed exams and other assessment activities

Exams or other assessment activities missed for reasons of unauthorized absence will be graded as zero. Authorized absence will result in rescheduled exams or compensation from other assessment activities.

CHECKING YOUR GRADES and RE-MARK POLICY

You will have **one week** from the date that an assignment (or test or mid-term exam) is returned to you **to appeal your mark**. If you wish to appeal a grade, you must submit to the component lead (or laboratory coordinator for labs) a written note justifying why you wish to have the assignment remarked, with the assignment attached. If your component lead or laboratory coordinator considers the written justification to be insufficient (e.g. simply wanting a higher grade is insufficient), the assignment will not be re-graded. If the justification is considered sufficient, the entire assignment will be re-graded. You must therefore understand that your mark can increase or decrease.

Your marks will be recorded on Avenue. It is your responsibility to check that all grades entered into Avenue are recorded properly. You must notify your component leaders and laboratory coordinator about any errors with regards to how your mark was entered. You have until 48 hours prior to the final exam to discuss any Avenue mark issues.

The policy for viewing and requesting a formal review of final exams will be available on Avenue.

COMMUNICATION BETWEEN STUDENTS AND THE INSTRUCTIONAL TEAM

Any e-mails addressed to faculty must have a brief, relevant subject line, must come from a mcmaster.ca e-mail account and must copy in all relevant parties (e.g. other markers, other group members). All e-mail communication addressed to students will be sent to their mcmaster.ca e-mail account.

All assignments must be handed in via Avenue, in the specified file format (usually pdf). Author(s) name(s) and group designations, if applicable, must be clearly marked on the first page of the work handed in. Submitted files must be named in a way to easily identify the assignment and the author and/or group designation.

Work that is late, handed in to the wrong person, inadequately identified, or in the wrong format, risks losing marks.

Instructors will endeavour to return marked materials within two weeks of hand-in.

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

https://www.mcmaster.ca/academicintegrity/turnitin/students/index.html

POLICY ABOUT ONLINE ACCESS OR ONLINE COURSE WORK REQUIREMENTS

In this course we will be using e-mail, Avenue, and PebblePad. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

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 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 (<u>http://www.mcmaster.ca/policy/Students-AcademicStudies/</u>).

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

Academic Integrity

http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf

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.

Student Code of Conduct

https://www.mcmaster.ca/policy/Students-AcademicStudies/Code of Student Rights and Responsibilities.pdf

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.

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.

McMaster Accommodation for Religious, Indigenous and Spiritual Observances Form (RISO):

At the beginning of EACH term, visit the website of the Office of the Associate Dean (Academic) <u>https://www.science.mcmaster.ca/associatedean/current-students/procedures-forms.html</u> if you need accommodations for religious, Indigenous and/or spiritual observances. Follow the procedure explained there under "Accommodation for Religious, Indigenous and Spiritual Observances Form (RISO)".

Inclusivity and Accommodations:

McMaster University aims to foster a supportive, inclusive learning environment that will encourage both individual and collective growth. Students are required to register with Student Accessibility Services (SAS) first (<u>https://sas.mcmaster.ca/)</u>. Any student who then wishes to invoke an accommodation for any aspect(s) of this course must contact the instructor at the beginning of the semester to discuss how the accommodations detailed in their SAS letter will be fulfilled in this course.

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

Extreme circumstance

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). 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. Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.