# **BMIS 498 (Special Topics)**

# Advances in Antimicrobial Resistance of One Health Pathogens

Course Code: BMIS 489.3 CRN: **31164** Term: Winter 2024 Time: Tuesday / Thursday 1:00 – 2:20 PM Location: 2A90 Health Sciences Building Course Site: canvas

#### **Course Coordinator:**

Dr. Jessica Sheldon Office: Room 6B12 Health Sciences (Office phone: 306-966-4348) Email: jessica.sheldon@usask.ca Office hours: by appointment

#### **Co-Instructors:**

Dr. Jenny Wachter Office: Vido (Office phone: 306-966-1511) Email: jenny.wachter@mail.usask.ca Office hours: by remote appointment

Dr. Oleg Dmitriev Office: Room 3D30.7 Health Sciences (Office phone: 306-966-4377) Email: oyd584@mail.usask.ca Office hours: by appointment

# **Catalogue Description**

Themes related to antimicrobial resistance in the USask signature area of One Health will be covered through the presentation and discussion of primary research articles. Students are required to study all the manuscripts ahead of time and are encouraged to actively participate in the in-class discussion. An emphasis will be placed on the critical analysis of the research articles discussed. Methods generally applicable and of interest to the field will also be discussed.

Prerequisite(s): BMSC 320.3

# Land Acknowledgement

As we engage in our studies, I would like to acknowledge that the Saskatoon campus of the University of Saskatchewan is on Treaty Six Territory and the Homeland of the Métis. We pay our respect to the First Nation and Métis ancestors of this place and reaffirm our relationship with one another. I would also like to recognize that some may be attending this course from other traditional Indigenous lands. I ask that you take a moment to make your own Land Acknowledgement to the peoples of those lands. In doing so, we are actively participating in reconciliation as we navigate our time in this course, learning and supporting each other.

# **Learning Outcomes**

By the completion of this course, students will be expected to:

- 1. Understand the development, detection, mechanisms of action and strategies to combat antimicrobial resistance
- 2. Discuss methods used to study antimicrobial resistance
- 3. Critically review, and analyse primary scientific literature
- 4. Design and create a graphical abstract to facilitate dissemination to a wide audience
- 5. Provide and address constructive criticism from peers

Information on literal descriptors for grading at the University of Saskatchewan and more can be found in the Academic Courses Policy on course delivery, examinations and assessment of students learning: <u>http://students.usask.ca/academics/grading/grading-system.php</u>

Please note: There are different literal descriptors for undergraduate and graduate students.

The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at: <a href="https://teaching.usask.ca/about/policies/learning-charter.php">https://teaching.usask.ca/about/policies/learning-charter.php</a>

# Midterm and Final Examination Scheduling

The midterm must be written on the date scheduled (March 7, 2024). There is no final examination for this course as the comprehensive assessment of your learning in this course is assessed by an in-class presentation.

# **Required Resources**

As content for this course will come directly from current primary literature, there is no required textbook. Any required material will be made available to you on Canvas whenever possible or as links to University-licenced or open-access journals.

# **Class Schedule**

Date	Session topic and format	Presenting	Comments
		student(s)/instructor(	
		s)	
Thurs	Introduction to BMIS 498:	Introductory lecture:	Example paper assigned for next
Jan 4	Instructors, Syllabus, and	Drs. Sheldon,	week assigned.
	Expectations	Wachter, and Dmitriev	
Tues	Journal club bootcamp: How to	Lecture: Dr. Sheldon	Read assigned article prior to class.
Jan 9	present an article		

Thurs	Journal club bootcamp: How to	Lecture: Dr. Sheldon	Critical evaluation of the previously
Jan 11	critically evaluate and select an		presented article and tips on
	article to present		creating effective presentations.
Tues	Topic 1: What is antimicrobial	Lecture: Dr. Sheldon	Students given assigned
Jan 16	resistance?		presentation dates
Jan 18	Topic 2: General mechanisms of	Lecture: Dr. Sheldon	
	antimicrobial resistance (AMR)		
Jan 23	Topic 2: General mechanisms of	Lecture: Dr. Sheldon	
	antimicrobial resistance (AMR)		
Jan 25	Topic 3: Surveillance of AMR	Lecture: Dr. Sheldon	
Jan 30	Topic 4: Genetics and	Lecture: Dr. Wachter	
	transmission of AMR		
Feb 1	Topic 4: Genetics and	Lecture: Dr. Wachter	Student paper selection and
	transmission of AMR		justification due.
Feb 6	Topic 5: Alternative treatment	Lecture: Dr. Wachter	
	strategies for pandrug-resistant		
	pathogens		
Feb 8	Journal club bootcamp 2:	Lecture: Dr. Sheldon	Presentation of graphical abstract
	Designing a graphical abstract		and tips for its production. Papers
			assigned for GA's.
Feb 13	Topic 6: One Health and AMR	Lecture: Dr. Sheldon	
Feb 15	Topic 7: New AMR Mechanisms	Lecture: Dr. Sheldon	
Feb 20	Reading Week	No class	
Feb 22	Reading Week	No class	
Feb 27	Topic 8: Using structural biology	Lecture: Dr. Dmitriev	
	to understand AMR		
Feb 29	Topic 8: Using structural biology	Lecture: Dr. Dmitriev	First draft of graphical abstract due
	to understand AMR		and distributed for peer evaluation
March	Topic 9: Positive applications of	Lecture: Dr. Dmitriev	
5	AMR		
March	Midterm Examination		
7			
March	Student Presentation 1		
12			
March	Student Presentation 2		Peer evaluation of graphical
14			abstract due
March	Student Presentation 3		
19			
March	Student Presentation 4		
21			
March	Student Presentation 5		
26			
March	Student Presentation 6		
28			
April 2	Student Presentation 7		
April 4	Student Presentation 8		Graphical abstract due

# Assessment Details

Assessment	Due Date	Grade
Midterm Examination	March 7, 2024	30%
Student Presentation	Schedule finalized second week of class	30%
Graphical Abstract	First draft – Feb 29 Final Submission – April 4	5% 15%
Peer Evaluation of Graphical Abstract	March 14, 2024	5%
Active discussion and participation	Ongoing	10%
Student Presentation Quizzes	At the beginning of each student presentation	5%

## **Evaluation Components**

## 1. Midterm Exam

Value: 30% of final grade

Type: Written exam on March 7, 2024

<u>Description</u>: Students will write an 80-minute exam consisting of multiple choice and openended short answer questions to assess their understanding of the course materials presented in lectures.

## 2. Student Presentation

Value: 30% of final grade broken down into:

- Paper selection and justification (due February 1, 2024) 5%
- In-class quiz (due to instructor two days before assigned presentation date) 5%
- Presentation and leading discussion 20% (graded out of 100)

Type: Oral presentation, slide deck, created in-class quiz

<u>Description:</u> Students will present seminars that highlight recent work published in the field of antimicrobial resistance. **Students must select an interesting and high-quality paper** that was published recently (last 2 years) in a peer-reviewed journal (Ex: Journal of molecular biology, eLife, Cell Host & Microbes, Infection and Immunity, Journal of Bacteriology, Molecular Microbiology, PLOS Pathogens, PNAS, EMBO J, Nature Microbiology, Nature Communications, J. Biological Chemistry, Science, Veterinary Microbiology, Structure, etc). Note that the impact factor of a journal is no guarantee of high paper quality. The selected paper must be in the scope of the class "Antimicrobial resistance in One Health Pathogens". Selecting a good paper for presentation and discussion is a serious task. The paper is expected to be thoroughly examined before selection and seeking approval. Pre-print articles are acceptable, provided they have been carefully examined / selected as per guidelines above. The PDF of the selected paper and PDF of supplementary materials must be sent to the instructors for approval along

with an approximately **150-word justification** for why this paper was selected and it's appropriateness by February 1, 2024. Instructors reserve the right to request an alternate paper if the chosen one is not appropriate for the course, so discussion or your choice with the instructor before the due date is highly encouraged. Papers will be approved in the order they have been submitted and then the PDF of the paper along with the PDF of supplementary materials (if any) will be uploaded on Canvas. Make sure to review any already approved papers selected by other students. If someone has already selected the paper you chose (even for a class slot that is after your assigned slot), you need to find another one.

Presenters will **create a 10 question multiple choice open-book quiz** on the paper they are presenting and submit a copy to the instructor 2 days before their presentation. Students will be given 10 minutes to complete your quiz at the start of lecture before you give your presentation. This will help ensure that everyone will be ready for the topic of the day, enhancing the quality of the discussion during and after the presentations.

Each student will **prepare a 30 min presentation** on their selected paper and will be responsible for stimulating class discussion **during and after the presentation**. The whole presentation/discussion should take no longer than 60 minutes of the lecture after the quiz is complete. The quality of the presentation will be graded. Completion of this assignment is required to pass the course.

General presentation guidelines are shown below to set expectations:

- 1. Background/perspective leading up to the study (~4 slides)
  - a. This is as important for us to assess the paper as the detailed analysis of the data. Therefore, this section of the presentation must be strong.
  - b. Cover background needed to understand if the paper is novel, pertinent or ground-breaking, even if not included in the paper itself.
  - c. Cover what in the literature was a jumping off point for the current paper, why this study needed to be done and what this study has added to the field.
  - d. Put the work in proper perspective for the field.
- 2. Techniques/Methods (~1-2 slides)
  - a. If techniques are outside the range of normal expertise for the class, provide clear explanations so the class learns from you and can assess if the experiments were well done or not.
- 3. Results (~4-6 slides)
  - a. DO NOT present a rundown of all experiments. Only show the most significant experiments, the smartest experimental design, the "beauty" of the paper, anything you see that is remarkable. Everyone in the class will have read the paper, so it is not necessary to present everything.
  - b. Only briefly summarize the key data leading to the figures you want to present in detail.
- 4. Conclusion/big picture (~1-2 slides)
  - a. Discuss potential follow-ups and opportunities (implications, future objectives) arising from the paper.
  - b. Try to bring the message home: if you can, try to relate the work presented to work done at USask. If you or a friend has laboratory experience, some concepts may carry over to your own research or one of your peers. Describe how this could apply, how it would need to be modified, what additional angles could be covered in Microbiology and

Immunology, and you can engage members of the lab you have in mind to enhance that discussion.

5. Throughout: **The audience should be asked for input by the presenting students.** Input can start before the presenting student(s) reveal(s) what they have thought about, by having a vote on whether the paper should have been published where it was published, or whether the overall conclusions/findings are supported by the data, by asking which experiment they consider the key experiment before the presenters disclose their choice. Once the presenters have gone through their material or a specific section thereof, they can engage the class to discuss if and why they have a divergent point of view about what is critical in the paper, whether experiments are well done or not (controls, statistics etc).

## **Presentation Rubric**

Criteria	points	
Background and perspective leading up to the study is given and aids in comprehension		
Summary of overall hypothesis and objectives of the paper were given		
Techniques and methods relevant to the experiments presented are given	10	
Key experiments $(2 - 3)$ selected for discussion. Student avoids running through the entire paper figure by figure and choice of key experiments was appropriate	20	
Overall significance of the results to the paper and field were presented and accurate	20	
Good effort to engage the class and lead the discussion, demonstration of knowledgeable responses	10	
Presentation skills (audible, clear, reasonable pace)	10	
Slide quality (font size and images are legible, slides are enhanced to facilitate following the data, logical flow of information, etc.)		
TOTAL	100	

# 3. Graphical Abstract

Value: 20% (5% for draft, 15% for final)

<u>Type:</u> Assignment Submitted on Canvas (draft: Feb 29, final: April 4)

<u>Description</u>: Students will have to prepare a graphical abstract for an assigned paper. The paper(s) will be assigned to students on February 8th. Make sure the graphical abstract represents the major concepts/discoveries highlighted in the paper in an original format, differing from the paper's graphical abstract if one was already included. Though multiple students may be assigned the same paper for a graphical abstract, each student must produce their own graphical abstract. The graphical abstract is to be submitted as a pdf on Canvas. The graphical abstract will be graded based on: 1/ the aesthetics/graphics, 2/ how appropriate the

content is to the essential message of the paper, 3/ the clarity of message conveyed by the graphical abstract.

# **Graphical Abstract Rubric**

Criteria	marks	
First draft – graded using the same criteria of aesthetics, clarity and accuracy below, students will receive peer feedback to incorporate into their abstract for improvement before final submission		
Overall aesthetics: Are the graphics clear and any font legible? Do the colour schemes work well together? How likely would this image be in enticing you to read the paper?	5	
Clarity of message/ease of understanding: Is the overall take-home message easily understandable without needing to further reference the paper?		
Accuracy: Does the graphical abstract accurately represent the key findings of the paper	5	
TOTAL	20	

## 4. Peer Evaluation of Graphical Abstract

Value: 5% of final grade

Type: Annotations and Critique due March 14, 2024

<u>Description:</u> Students will be assigned a peer's graphical abstract for review the same day drafts are due. After reading the paper for the abstract, you will proof, critique and annotate suggested changes to improve the graphical abstract using the same rubric the instructor uses. You will also provide up to one written page of notes discussing how to improve the graphical abstract and what parts were done well. The grade for the peer review will be based on accuracy, appropriate tone and language, and quality of the constructive feedback.

# 5. Active Discussion and Participation

Value: 10% of final grade

## <u>Type:</u> Ongoing in-class performance

<u>Description</u>: A strong discussion grade requires a student to carefully read and review the posted PDF (considering the topics, techniques & impact) before class so you can make active and enlightening contributions to class discussions. This class is geared to help students develop critical thinking skills and practice voicing their scientific opinion. This is only possible if all students come to class with a good knowledge of the whole paper, having thoroughly read the paper. All students are expected to participate actively throughout the term, ideally on a voluntary basis, but otherwise prompted individually by members of the presenting group. Faculty will only interject if complementary information or corrections are needed. Please come prepared.

## **Discussion and Participation Rubric**

86-100%: Contributed frequently and insightfully; demonstrated critical understanding of readings; showed awareness of how readings relate to each other and to overarching course themes; interacted with other students and built on their comments.

70-85%: Contributed regularly; grasped main points of readings; showed awareness of interrelationships between readings and themes OR interacted with other students, but not necessarily both.

50-69%: Contributed occasionally; demonstrated partial understanding of readings; some comments unconnected to main subject or restatements of those offered by other students.

0-49%: Remained silent or contributed minimally; demonstrated little or no understanding of readings; made irrelevant or erroneous comments; absent without excuse

#### Submitting Assignments

Assignments (visual abstract, presentation slide deck, peer feedback, presentation quiz) will be submitted through Canvas. To submit assignments through canvas you must first submit a certificate of completion from the 20-minute short course **Academic Integrity in the Biomedical Sciences** (<u>http://usask.ca-</u>

<u>central.catalog.canvaslms.com/browse/biomed/courses/academic-integrity-in-the-biomedical-sciences</u>) The certificate is valid for 365 days after completion & you can submit it for as many biomedical courses as needed. In the **Academic Integrity** module in our canvas course you will find the **Academic Integrity Certificate Submission** tool. Click [Start Assignment] and you will be prompted to attach a pdf copy of your certificate. After submission, canvas will automatically unlock the **Assignments** module in the course and any greyed-out items will be accessible to you.

#### Late Assignments

Late assignments will not be accepted except in extraordinary circumstances beyond the student's control.

#### **Criteria That Must Be Met to Pass**

Students must complete the visual abstract and presentation components of the course in order to receive credit for the course.

#### **Attendance Expectations**

Students are encouraged to actively participate in class by posing questions, interacting with their peers and instructor. Participation in discussions will be evaluated, and attendance is mandatory during the student presentation component of this course. In order to receive credit for this course students must attend all student presentation sessions or obtain an excused absence at the discretion of the course coordinator.

## **Recording of the Course**

The instructor will record lectures for student review purposes and student presentations will be recorded to facilitate peer feedback and assessment of the presentations and discussions by the instructor.

# Copyright

Course material created by your instructors and peers is their intellectual property and **cannot be shared without written permission**. This includes exams, PowerPoint/PDF lecture slides and other course notes. If materials are designated as open education resources (with a creative commons license) you can share and/or use them in alignment with the <u>CC license</u>. Other copyright-protected materials created by textbook publishers and authors may be provided to you based on license terms and educational exceptions in the <u>Canadian Copyright</u><u>Act</u>.

You are responsible for ensuring that any copying or distribution of materials that you engage in is permitted by the University's "<u>Use of Materials Protected By Copyright</u>" Policy. For example, posting others' copyright-protected materials on the open internet is not permitted by this policy unless you have copyright permission or a license to do so. For more copyright information, please visit <u>https://library.usask.ca/copyright/students/index.php</u> or contact the University Copyright Coordinator at <u>copyright.coordinator@usask.ca</u> or 306-966-8817.

# Student Feedback

You will be provided opportunities throughout the term to provide feedback about the course. This will include the use of the University administered course feedback system, SLEQ, both partway through the class and at the end of term, and less formal methods. I value this feedback and use it to modify and improve the course to best meet student learning needs.

# Academic Integrity

The University of Saskatchewan is committed to the highest standards of academic integrity. <u>https://academic-integrity.usask.ca/</u>

Students are urged to read the <u>Regulations on Academic Misconduct</u> and to avoid any behaviours that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence.

For help developing the skills for meeting academic integrity expectations, see: <u>https://academic-integrity.usask.ca/students.php</u>

Students are encouraged to ask their instructors for clarification on academic integrity requirements.

All students are encouraged to be aware of the rules for courses set out in the <u>Academic</u> <u>Courses Policy on Class Delivery, Examinations, and Assessment of Student Learning</u>.

Students in this course are required to show a completion certificate for the short course Academic Integrity in the Biomedical Sciences <u>http://usask.ca-</u> central.catalog.canvaslms.com/browse/biomed/courses/academic-integrity-in-the-biomedical-sciences

Artificial intelligence text generator tools (also known as large language models) **are not** permitted to be used in any assessments for this course. Any use of such tools will be considered academic misconduct in this course.

Students wanting to connect their assessment in this course to assessments they have completed in another course must get explicit permission of the instructor in order to avoid potential academic misconduct of self-plagiarism.

# Access and Equity Services (AES) for Students

Access and Equity Services (AES) is available to provide support to students who require accommodations due to disability, family status, and religious observances.

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals at any time. Those students who are registered with AES with mental health disabilities and who anticipate that they may have responses to certain course materials or topics, should discuss course content with their instructors prior to course add / drop dates.

Students who require accommodations for pregnancy or substantial parental/family duties should contact AES to discuss their situations and potentially register with that office.

Students who require accommodations due to religious practices that prohibit the writing of exams on religious holidays should contact AES to self-declare and determine which accommodations are appropriate. In general, students who are unable to write an exam due to a religious conflict do not register with AES but instead submit an exam conflict form through their PAWS account to arrange accommodations.

Any student registered with AES, as well as those who require accommodations on religious grounds, may request alternative arrangements for mid-term and final examinations by submitting a request to AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.

For more information or advice, visit <u>https://students.usask.ca/health/centres/access-equity-services.php</u>, or contact AES at 306-966-7273 (Voice/TTY 1-306-966-7276) or email <u>aes@usask.ca</u>.

# **Student Supports**

Academic Help – University Library

Visit the <u>University Library</u> and <u>Learning Hub</u> to find supports for undergraduate and graduate students with first-year experience, study skills, learning strategies, research, writing, math and statistics. Students can attend <u>workshops</u>, access <u>online resources and research guides</u>, book <u>1-1 appointments</u> or hire a <u>subject tutor</u> through the <u>USask Tutoring Network</u>

Connect with library staff through the <u>AskUs</u> chat service or visit various <u>library locations</u> on campus.

Enrolled in an online course? Explore the Online Learning Readiness Tutorial.

#### **Teaching, Learning and Student Experience**

Teaching, Learning and Student Experience (TLSE) provides developmental and support services and programs to students and the university community. For more information, see the students' website <u>http://students.usask.ca</u>.

#### **College Supports**

Students in Arts & Science are encouraged to contact the Undergraduate Student Office and/or the Trish Monture Centre for Success with any questions on how to choose a major; understand program requirements; choose courses; develop strategies to improve grades; understand university policies and procedures; overcome personal barriers; initiate pre-career inquiries; and identify career planning resources. Contact information is available at: (http://artsandscience.usask.ca/undergraduate/advising/)

#### **Financial Support**

Any student who faces unexpected challenges securing their food or housing and believes this may affect their performance in the course is urged to contact Student Central <a href="https://students.usask.ca/student-central.php">https://students.usask.ca/student-central.php</a>.

#### Gordon Oakes Red Bear Student Centre

The Gordon Oakes Red Bear Student Centre) is dedicated to supporting Indigenous student academic and personal success. The Centre offers personal, social, cultural and some academic supports to Métis, First Nations, and Inuit students. The Centre is an intercultural gathering space that brings Indigenous and non-Indigenous students together to learn from, with and about one another in a respectful, inclusive, and safe environment. Visit <u>https://students.usask.ca/indigenous/index.php</u> or students are encouraged to visit the ASC's website <u>https://students.usask.ca/indigenous/gorbsc.php</u>

#### International Student and Study Abroad Centre

The International Student and Study Abroad Centre (ISSAC) supports student success and facilitates international education experiences at USask and abroad. ISSAC is here to assist all international undergraduate, graduate, exchange, and English as a Second Language students in their transition to the University of Saskatchewan and to life in Canada. ISSAC offers advising and support on matters that affect international students and their families and on matters related to studying abroad as University of Saskatchewan students. Visit <a href="https://students.usask.ca/international/issac.php">https://students.usask.ca/international/issac.php</a> for more information.