DEPARTMENT OF CHEMISTRY AND BIOMOLECULAR SCIENCES

UNIT OUTLINE - GUIDE, SYLLABUS AND TIMETABLE

CBMS306 – MEDICINAL CHEMISTRY

SEMESTER 1, 2014

UNIT CONVENOR – A/PROF JOANNE JAMIE

F7B231, PH 9850 8283, E-MAIL joanne.jamie@mq.edu.au

PREREQUISITE - CBMS204 (P) and (3cp from 200-level CBMS exc CBMS235)

URL  ilearn.mq.edu.au

(login and follow prompts to Medicinal Chemistry)
Welcome to CBMS306 (Medicinal Chemistry). CBMS306 was primarily designed for the Bachelor of Medical Sciences (Medicinal Chemistry) students but is of value to anyone interested in drug (medicine) discovery and design, mechanisms of drug action and factors that affect drug action. This includes all chemistry and biomolecular sciences majors, and students from the psychomedical and biomedical sciences strands of the Bachelor of Medical Sciences. CBMS306 is a non-traditional medicinal chemistry course: i.e., it is not comprehensive in its coverage of drugs and does not focus on drug synthesis: its focus is on principles.

What is medicinal chemistry? Simply, medicinal chemistry is the application of chemistry to the discovery, design and synthesis of new drugs. Thus the medicinal chemist can be viewed as the originator of drugs that subsequently reach the clinic. Medicinal chemistry is an interdisciplinary science. Its successful application to new drug discovery and development involves knowledge of organic chemistry, biology, physiology, microbiology, immunology, biochemistry, pharmacology, medicine and pharmaceutics, among others. This is not to say that the medicinal chemist is an expert in each of these fields. The successful medicinal chemist is an expert organic chemist who has, or can acquire, sufficient knowledge in other disciplines to apply that knowledge to drug design. We shall have opportunities to illustrate the dependence of medicinal chemistry on knowledge from other disciplines as we progress through this course.

The central core of CBMS306 is the description of methods used for the discovery of new drugs, how these are modified to produce more active compounds, transportation to and from their points of action.
and how they are cleared from the body. Topics covered include: the structure and function of biological targets (proteins and DNA); sources of new drugs or drug leads from nature and synthesis; methods to identify what structural features are important for biological activity (structure-activity relationship); what happens to a drug in the body and how it interacts with its biological target in the body (pharmacokinetics and pharmacodynamics); and how to make more active, selective or less toxic drugs. This is followed by an introduction to combinatorial chemistry, use of chemoinformatics in drug design, and case studies (e.g. antibacterial agents, receptor agonists and antagonist). The theory is complemented by a discovery based laboratory project on identifying structure-activity relationships of the sulfonamides, an important class of antibacterial agents, incorporating synthetic chemistry, spectroscopic methods and bioassays.

**TEACHING STAFF**

- Unit Convenor and Lecturer A/Prof Joanne Jamie, F7B231, ph 98508283, joanne.jamie@mq.edu.au
- Lecturer Prof Peter Karuso, F7B232, ph 98508290, peter.karuso@mq.edu.au
- Guest lecturer Prof Shoba Ranganathan, F7B121, ph 98506262, shoba.ranganathan@mq.edu.au

There are no formal office hours for the teaching staff, however, you are expected to contact them on any questions you have with their topics and the unit convenor on any administrative questions as soon as your concern arises. You are encouraged to phone or email to organise a meeting. You may also wish to ask questions using the discussion board on the website.

**CLASSES**

- **Timetable**: Please check https://timetables.mq.edu.au/2014/ for the official timetable of the unit.
- **Lectures/tutorials**: The first 3/4 of CBMS306 will provide an overview of the important concepts in medicinal chemistry and the last 1/4 will concentrate on case studies. CBMS306 has three hours/week allocated to lectures/tutorials. While formal lectures will be presented, discussion sessions will also form a major part of the classes. This will be supplemented by practical classes utilising synthetic chemistry, spectroscopic methods and bioassays.

The laboratory classes will be run in groups and students are required to, in part, design the experiments, using literature procedures as a guide. Considerable preparation is therefore needed. Past students have found this a valuable experience as it gives them a realistic approach to conducting research. The laboratory classes will run every week, on Friday 2-6 pm except the mid-session break and weeks 12 and 13. In week 1, the laboratory class will be a preparative session, in which the groups will discuss structure-activity relationships and use this to rationally choose their target sulfonamides, learn how to use SciFinder Scholar and Reaxys for literature searching and start to identify key preparative methods for the sulfonamides, and prepare flow diagram and risk assessment forms for commencement of the wet laboratory classes (beginning week 2). This week 1 preparative session will be run in the write-up room E7B346 (unless notified otherwise), and commence at 2 pm. The laboratory classes will run from week 2-11 in laboratory E7B350. The 2-6pm session of weeks 12 and 13 will be used for finalising the laboratory report and the write-up room (unless notified otherwise) will be available for this.


There is a large range of journals and other reference books that you should look at throughout the course. Examples include:

- Journal of Medicinal Chemistry (RS402.J6)
- Journal of Pharmacy and Pharmacology (RS1.J72)
- Bioorganic and Medicinal Chemistry Letters (QP550.B56)
- “Burger's medicinal chemistry and drug discovery”, Burger, Alfre (RS403.B81995)
- Computational chemistry, Grant, Guy H. (QD39.3.E46.G73 1995)

Further articles will also be placed in dropbox or iLearn.

This is ONLY a starting point. You are free to use whatever facilities you want to complete this unit.

UNIT WEB PAGE

The web page for this unit can be found at iLearn.mq.edu.au. Just login and follow the prompts to Medicinal Chemistry. You can use any web browser such as Firefox, Internet Explorer or Safari to login. iLearn is the name for Macquarie University’s Learning Management System (LMS). The iLearn online learning environment enables learning, teaching, communication and collaboration. It is used to make lecture notes, laboratory notes, discussion forums, digital lecture recordings and other learning resources available to students online. See http://www.mq.edu.au/iLearn/ for more information.

TECHNOLOGY USED

You are expected to access the unit web site frequently. This contains important information including notes on the topics to be covered; the laboratory manual; What You Need to Know Sheets; your marks for practicals, quizzes and the mid-session exam; and past exam papers, including with answers. Additionally, the web site will also be used to post important messages and links to internet facilities and sites of relevance to the course, downloadable software, and lots of other interesting material.

If you do not have your own computer you may wish to access the Medicinal Chemistry web resources on campus using the PC computers in the Library or in the C5C computer laboratories. To view notes on all the topics and past exams on the unit web site, you will require Adobe Acrobat Reader Version 9 or later to be installed on your computer. Acrobat Reader can be downloaded from the Adobe web site http://get.adobe.com/uk/reader/. If you are using the computers in the library, then Acrobat has already been installed. Please note information will also be sent by email to your student email account so please look at your email account on a frequent basis.

You are expected to access SciFinder Scholar and Reaxys to assist in searching the literature. These are available through the library web site.
Hand-held calculators will be occasionally used in tutorials and practicals, for tests and in the final examination. Note that text-retrieval calculators are not allowed in the in-semester tests or final examination.

**EXPECTED LEARNING OUTCOMES**

CBMS306 starts with an overview of structure and function of important biomolecules that are drug targets and then focuses on how drugs interact with these molecules to bring about their pharmacological activity. The aim of the unit is to integrate chemical biology and organic chemistry to reveal how these are used in medicinal chemistry to design and synthesise new drugs and to understand their mode of action.

CBMS306 is designed to provide:
- a basic chemical understanding of life processes and biological control;
- a chemical basis for the rational design, synthesis, and mechanism of action, and selective metabolic inhibition of drugs;
- basic laboratory skills necessary for research in medicinal chemistry;
- an appreciation of medicinal chemistry and the chemical aspects of drug synthesis, and
- a chemically-oriented foundation for post-graduate research and study in medicinal chemistry and professional studies in the health sciences.

By the end of the unit, you should be able to:
- define medicinal chemistry and what medicinal chemists know
- define the major biological targets for drugs and how these drugs achieve their pharmacological effect
- define where new drugs come from
- describe qualitatively and quantitatively the relationship between structure and biological activity of drugs
- describe qualitatively and quantitatively the factors affecting drug absorption, distribution and metabolism
- understand the reasons for drug incompatibility and interactions
- have a detailed knowledge of the history, development, use and future of specific drug classes
- be able to design experiments to determine the structure-activity relationship within a class of drugs
- use the chemical literature to find suitable methods to make new compounds
- use analytical techniques to determine the molecular composition of reaction products.

In addition to the discipline-based learning outcomes above, this unit will also help develop **graduate capabilities**. These are the building blocks for developing the attributes valued in a university graduate. Some of the attributes and skills that CBMS306 can help you develop are:

- **Discipline Specific Knowledge and Skills**: The topics explored in CBMS306 are fundamental to the discipline of chemistry. You will be applying problem-solving skills in the chemistry context, applying chemistry theory to practice in order to design and carry out laboratory experiments, using chemistry specific apparatus and techniques, and will apply safe laboratory practices.
• **Critical, Analytical and Integrative Thinking; Problem Solving and Research Capability:** Within this unit you will be developing and practicing your ability to apply problem-solving strategically both in situations where there are clear solutions and in situations demanding critical, analytical and integrative thinking. This is especially true in the laboratory component, where you will be conducting a discovery-based research project and will need to be deeply involved in problem solving and research processes in the chemistry context. You will be solving problems by analysing the information given or discovered, looking for other sources of information to apply, and looking for the scope and limitation of the context in which the problem and solution lie. In many cases you will be using standard and specialised IT technology for the discovery of information, the analysis of data and the presentation of results.

• **Effective Communication:** CBMS306 will help equip you with both oral and written communication skills, through your practical report and your written assignments and oral tasks, and through the communications you will be engaged in with your lecturers, your demonstrators and your classmates, especially in the group laboratory work. Part of your assessment will be concerned with your ability to communicate in clear, concise and appropriate, context-dependent modes (formal reports, oral, informal group discussions).

• **Engaged and Ethical Local and Global Citizens:** Engaged and ethical behaviour will be addressed in the professional chemist context, *i.e.* you will be concerned with collecting data and information with appropriate acknowledgement of sources, you will learn ways of performing experiments and recording outcomes in a manner that conforms to the expectations of the profession and community at large. You will be working with people from a variety of cultural and economic backgrounds and you will be expected to be able to form cohesive and effective teams and share the workload with other students in your class. In the theory section of the course we will touch upon ethical issues of interest to contemporary society in relation to drug discovery and development and financial compensation.

• **Socially and Environmentally Active and Responsible:** You will be working in small teams for much of CBMS306, especially in the laboratory component of the course, giving you the opportunity to develop your ability to work with others as a leader and a team player and to have a sense of connectedness and mutual obligation with others.

• **Capable of Professional and Personal Judgement and Initiative:** Especially during your laboratory work, you will be expected to develop discernment and common sense in your professional and personal judgement. You will also be given assignment and test questions that will give you the opportunity to exhibit these capabilities, especially in the context of the application of “models” in chemical knowledge and theory.

• **Commitment to Continuous Learning:** Some of the coursework in this unit is open ended and without a predefined structure or direction. The topic is far too big to cover in one semester so we have designed the content to stimulate curiosity and lead you to continue to pursue knowledge for its own sake. You will be have opportunities to influence the topics covered and reflect on your experiences, learn from them, and grow personally, professionally and socially.

**Teaching and Learning Strategy**

CBMS306 is a 3 credit point, half year unit and will require an average of 9 hours of work per week (contact hours plus self-study time). For students with weak chemistry backgrounds, more time than the average 9 hours per week will probably be necessary to perform satisfactorily in this unit.
**CBMS306** is run with three hours of lectures/tutorials per week, along with 4 hour blocks of laboratories/workshops. Students are required to attend all lectures, tutorials and laboratory classes. Active participation by the students in all of these fora is expected.

- Lectures will be presented as a combination of formal lectures and interactive tutorial sessions. Some lecture material will be available on the unit web site, while other material will be provided in the lecture class. Learning is an active process, and as such, you must engage with the material. This means reading the textbook (and beyond) **before** and **after** lectures, attempting the assignment questions and other questions, discussing the concepts with your classmates and lecturers. Do not be afraid to ask questions – everyone benefits from a robust and open discussion of the topics.
- Assignment questions are issued so that you will have the opportunity to use the information provided in the lectures and textbook and to test your degree of understanding of those topics.
- Spot tests and a mid session test will also be run in the lecture session. The spot tests will cover any material prior to that day’s lecture, therefore all students are expected to keep up to date with lecture material through revision each week. The spot tests and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.
- All laboratory experiments will be conducted in groups. These have a highly collaborative and investigative approach, where you will be designing and synthesising a series of sulfonamides and subsequently testing them for antibacterial activity to determine the important features for their antibacterial activity. This laboratory work is designed to give real life experiences in research by involving students in the design of the experiments, using literature procedures as a guide, and trouble shooting to identify the best experimental conditions. It will emphasise the importance of being highly prepared for all experiments and being fully aware of all safety procedures, proper recording and reporting of all data and interpreting of all results, and having an analytical and inquisitive approach.

**RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES**

**Assessment:** The grades you achieve at Macquarie University are descriptive rather than numeric. The assessments and conditions on your performance (attendance, completion, *etc*) help to decide which of these descriptive grades applies to your work for the entire unit.

Your raw marks from assessments are combined into a weighted sum. The weighted sums for the whole class are ranked, and compared with rankings for the same unit in previous offerings and across other units for appropriate consistency. This process of comparison allows for the identification of any unusual influences on class performance that might warrant the weighted sums of marks being scaled or otherwise altered. The numerical cut-offs for each descriptive grade are then determined. The numerical value with which you will be issued (the Standardised Numerical Grade, SNG) is determined to match your descriptive grade by standardising the weighted sums of raw marks to match standard scores out of 100. The SNG gives you an indication of how you have performed within the band for your descriptive grade and does not necessarily reflect the numerical grades achieved for the internal and external assessments.

It is our professional responsibility as your teachers to assign you a descriptive grade that accurately reflects your performance in a unit. Our grading decisions are subject to scrutiny from our academic colleagues at the Department, Faculty and at the University Senate level.

The Grades range from High Distinction to Fail, and are defined in the Handbook as follows:
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<tr>
<th>Grade</th>
<th>SNG</th>
<th>Description</th>
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<tr>
<td>HD</td>
<td>85-</td>
<td>Work of outstanding quality. This may be demonstrated in areas such as criticism, logical argument, interpretation of materials or use of methodology. This grade may also be awarded to recognise a high order of originality or creativity in student performance</td>
</tr>
<tr>
<td>High Distinction</td>
<td>85-100</td>
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<tr>
<td>D</td>
<td>75-</td>
<td>Work of superior quality in the same areas of performance as above. This grade may also be awarded to recognise particular originality or creativity in student performance</td>
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<tr>
<td>Distinction</td>
<td>75-84</td>
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<tr>
<td>Cr</td>
<td>65-</td>
<td>Work of predominantly good quality, demonstrating a sound grasp of content together with efficient organisation, selectivity and use of techniques</td>
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<tr>
<td>Credit</td>
<td>65-74</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>50-</td>
<td>Satisfactory achievement of unit objectives</td>
</tr>
<tr>
<td>Pass</td>
<td>50-64</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0-49</td>
<td>Failure to achieve unit objectives.</td>
</tr>
<tr>
<td>Fail</td>
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Your grade awarded at the completion of the unit will be based on marks obtained as follows:

- Practical: 25% (12.5% group mark and 12.5% individual mark)
- Assignment: 10%
- Mid-semester test: 10%
- Spot tests: 5%
- Final Exam: 50%

**Practical** – The practical work (synthesis and antibacterial structure activity relationship of sulfonamides) will be conducted in groups, with ~4-6 people per group. For each group a report in the style of a journal article will be produced at the end of the semester. Following your week 1 laboratory preparation session (March 7), in week 2 in the Friday March 14 lecture/tutorial class, each group will be asked to present a short oral presentation on the justification of your group’s choice of final target compounds and possible synthetic procedures. In week 6 (April 11), each of you will submit your laboratory notebook and each group will present a formal write up of the experimental procedure for the synthesis of one of your sulfonyl chloride-amine condensation products, including spectral data by the end of the laboratory session. Feedback will be provided to help you improve your scientific writing skills and laboratory practices and for general understanding of the practical work. The combined week 2 and week 6 assessment tasks will be worth 7.5% (5% individual mark, 2.5% group mark). At the end of the semester (by Week 14, Monday June 16, 5pm to Prof Karuso, F7B232), each group will hand in the final report written in journal format and each student will hand in their laboratory notebook. The whole group will get the same mark for the report (/10%), but each student will be given an individual mark for their laboratory notebook, general safety and participation in the laboratory (/7.5%). Proper
recording of experimental procedures and spectral data, analysis of results and discussion and conclusion of these will all be taken into account in the marking. Full details on what is expected for assessment of the practical component is provided in the laboratory manual and on the web site (see under “Laboratory Notes”).

**Test** - There will be a 50 minute test (/10%) in **Week 9, Friday May 16, 1 pm sharp**. This will cover up to the end of prodrugs. This is designed to give you specific feedback on your understanding of the topics up to this stage to assist you in your further study of the unit.

**Spot tests** - Spot tests (/5%) may be conducted at any stage within the lectures. They are to encourage continuous learning of the lecture material without the stress of a significant assessment component.

**Assignment** – The assignment consists of a report (10%) that summarises the chemical and biological properties of a pharmaceutical agent in current use and how these relate to its function and properties in the body, along with general historical importance of the drug. This assignment is designed to provide skills in searching the literature and understanding the properties of the pharmaceutical agent from a molecular point of view. The assignment is due **Week 7, Tuesday, April 28, 9am, Science Student Centre, E7A**. It must be accompanied with the assignment cover sheet provided on the web site.

**Final exam** – the final exam (/50%) will be 3 hours in length with 10 minutes reading time. It is designed to assess specific understanding and holistic concepts of all the topics presented within the course and an opportunity for you to show what knowledge you have obtained and how you can be apply this to new problems.

Your marks (spot tests, mid-semester test, laboratory, assignment) will be placed on the CBMS306 web site. The **minimum requirement** to achieve a passing grade for CBMS306 is **satisfactory performance** in separately both the **final exam** and the **laboratory** component.

**Final Examination Details:** The examination timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations. You are expected to present yourself for examination at the time and place designated by the University in the Examination Timetable. This could be any day after the final week of semester and up until the final day of the official examination period. It is Macquarie University policy to **not set early examinations** for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period.

The only exception to sitting an examination at the designated time and place is because of documented illness or unavoidable disruption. Absence from the final exam will result in a grade of F except in the case of a genuine medical emergency or misadventure as defined by the University (see below). In these circumstances you may wish to consider applying for Special Consideration. The special consideration process is available at [https://ask.mq.edu.au/](https://ask.mq.edu.au/).

**SPECIAL CONSIDERATION REQUESTS INCLUDING NON-ATTENDANCE AND EXTENSIONS**

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability. The University has a policy on special consideration request that may be found at [www.mq.edu.au/policy/docs/special_consideration/policy.html](http://www.mq.edu.au/policy/docs/special_consideration/policy.html). The University recognises that at times an event or set of circumstances may occur that:

- could not have reasonably been anticipated, avoided or guarded against by the student AND
• was beyond the student’s control AND
• caused substantial disruption to the student’s capacity for effective study and/or completion of required work AND
• substantially interfered with the otherwise satisfactory fulfilment of a unit or program requirements AND
• was of at least three (3) consecutive days duration within a study period and/or prevented completion of a formal examination.

This policy is instituted to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level. The form required to submit for a request for special consideration can be found on-line at ask.mq.edu.au. This form should be submitted as soon as possible to allow due consideration.

Non-Attendance: Students unable to attend a lecture/tutorial class with an assessable component (spot test, or mid-semester exam) or the final exam due to illness or other extenuating circumstances must fill in a special consideration form on-line (at ask.mq.edu.au) and provide formal documentary evidence as soon as possible AND contact A/Prof Joanne Jamie. For students who do have a valid reason for non-attendance of a spot test, you will need to contact A/Prof Jamie to see if an alternate time can be arranged to conduct these. If an alternate time can not be arranged for the spot test, an average mark will be provided based on the other spot tests. For valid non-attendance of the mid-semester exam, you will need to contact A/Prof Jamie to organise a deferred exam. If the final exam is missed due to a valid reason a Supplementary Examination can be granted. If a Supplementary Examination is granted, the examination will be scheduled after the conclusion of the official examination period. The offer of a supplementary examination is at the discretion of the academic staff and you should not assume that it will be provided. Supplementary Examinations are not make-up exams, i.e., a poor result in the final examination is not reason to request a supplementary examination, which are generally harder than the normal exam. Please note that if you are sick at or in the days just prior to the scheduled exam time you should contact the unit coordinator as soon as possible to discuss the possibility of a supplementary exam. It is normally unwise to sit an exam if illness or other circumstances will significantly affect your performance. You need to also request the deferred exam via ask.mq.edu.au.

If an absence is anticipated (perhaps for a mandatory religious or University associated sporting event) you must inform the unit convenor in advance that this will be the case and discuss alternative arrangements. Do not assume that you will be given special consideration after the event. For any unjustified absences students will receive a zero mark for the assessment task.

Extensions: Students unable to hand in a form of assessment on time due to illness or other extenuating circumstances must fill in a special consideration form online at ask.mq.edu.au and attach formal documentary evidence as soon as possible and contact A/Prof Joanne Jamie to discuss possible extensions. Extensions will be granted based on merit and will be more favourably considered if consultation with the unit coordinator on the need for an extension occurred BEFORE the due date. If there is no acceptable reason for a late submission, marks will be deducted at a rate of 5% per weekday for every day late.

UNIVERSITY POLICY ON ASSESSMENT

The University considers that assessment “of student learning performance and feedback on progress are pivotal and important processes in University learning and teaching. Assessment tasks communicate to students what must be learned and are vehicles by which the University assures itself, and society, of its
graduates’ capabilities” and is based on the “premise that it is important that through assessment students are encouraged to engage in their education, rather than merely pursue grades. Student engagement is best facilitated by learner managed learning in which students are active partners in the process through undertaking challenging responsibilities and making choices.” There are responsibilities and rights for both staff and students in respect to assessment. These include, but are not limited to, the right of academic staff to require that students:

- be focused on learning rather than merely the achievement of grades;
- make the effort to be informed of the rules and requirements for progression in their degree program;
- get assistance from the department, faculty and/or institution if they so require it;
- behave ethically and responsibly in their conduct of assessment tasks;
- engage in critical self evaluation in terms of their progress towards the espoused learning expectations;
- submit work on time that is their own except when shared ownership is part of the task;
- notify their lecturers as soon as possible if difficulties arise with timing, online access, availability of resources or other requirements of the task;

Students have a right to:

- be informed about all aspects of assessment policy and practices in each unit of study including criteria, standards and procedures to be met and penalties for breaches;
- have consistent application of policies, procedures and penalties;
- timely return of results with feedback to enable improved performance;
- information that allows them to calibrate their own performance against the expected performance standards;

The full statement on the Assessment Policy, Code of Practice and Procedure can be found at:


**ACADEMIC HONESTY**

The University declares that it is a “fundamental principle” that “all staff and students act with integrity in the creation, development, application and use of ideas and information”. This means that:

- all academic work claimed as original is the work of the author making the claim
- all academic collaborations are acknowledged
- academic work is not falsified in any way
- when the ideas of others are used, these ideas are acknowledged appropriately

You should be familiar with the University’s Policy on Academic Honesty practices and its Statement on Ethics. For further details see:

Academic Honesty Policy:  www.mq.edu.au/policy/docs/academic_honesty/policy.htm


The policies and procedures explain what academic dishonesty is, how to avoid it, the procedures that will be taken in cases of suspected dishonesty, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.
Examples of dishonest academic behaviours are:

**Plagiarism**: Using the work or ideas of another person and presenting this as your own without clear acknowledgement of the source of the work or ideas. This includes, but is not limited to, any of the following acts:

a) copying out part(s) of any document or audio-visual material or computer code or website content without indicating their origins

b) using or extracting another person’s concepts, experimental results, or conclusions

c) summarising another person’s work

d) submitting substantially the same final version of any material as another student in an assignment where there was collaborative preparatory work

e) use of others (paid or otherwise) to conceive, research or write material submitted for assessment

f) submitting the same or substantially the same piece of work for two different tasks (self-plagiarism).

**Deception**: includes, but is not limited to, false indication of group contribution, false indication of assignment submission, collusion, submission of a work previously submitted, creating a new article out of an existing article by rewriting/reusing it, using the same data to form the same arguments and conclusion, presenting collaborative work as one’s own without acknowledging others’ contributions, cheating in an examination or using others to write material for examination.

**Fabrication**: includes, but is not limited to, creating fictitious clinical data, citation(s), or referee reports.

**Sabotage**: includes, but is not limited to, theft of work, destruction of library materials.

Assignments are to be your own work. Using someone else’s words (either another student’s or from a book or journal article or a web site) without clear acknowledgement is plagiarism and can incur serious penalties. If it is ever necessary to use someone else’s words for a phrase or sentence, they should be placed in quotation marks and acknowledged at the end of the sentence. If you use or modify a diagram or figure from another author, that must be acknowledged underneath (e.g. Figure 3 from Fundamentals of Organic Chemistry, McMurry et al., 2010, p243). Lecturers want to read your own words and ideas.

In the event that a Lecturer identifies a case of academic dishonesty, the student will be advised, either on the submitted work or by a separate letter, and a record kept in the Faculty office. Students will always have the opportunity to discuss each case with their Lecturer if they indicate they wish to do so by either contacting the Lecturer or the Head of Department. Proven cases of academic dishonesty may result in the immediate award of an “F” grade.

**OTHER UNIVERSITY POLICIES**

Macquarie University is developing a number of policies in the area of learning and teaching. Approved policies and associated guidelines can be found at Policy Central: www.mq.edu.au/policy

**STUDENT SUPPORT SERVICES**

Macquarie University provides a range of Student Support Services. Details of these services can be obtained at: http://students.mq.edu.au/support/
CHANGES TO THE UNIT SINCE LAST OFFERING

The unit is being run similarly to 2013, with minor changes.

FEEDBACK

We are always open to suggestions for improving the content and delivery of this course. We are very happy to receive any constructive criticism that you may wish to provide.

We hope you find this course both educational and fun!

Joanne Jamie and Peter Karuso
# UNIT SYLLABUS AND TIMETABLE

<table>
<thead>
<tr>
<th>Topics</th>
<th>Lect/Tut</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Overview of Medicinal Chemistry</td>
<td>wk 1-2</td>
<td>JJ</td>
</tr>
<tr>
<td>Cellular targets (‘receptors’) for drug action</td>
<td></td>
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<tr>
<td>Binding of drugs to ‘receptors’</td>
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<tr>
<td>Interaction of ‘receptors’ with agonists and antagonists</td>
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<td></td>
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<tr>
<td>Protein structure and function</td>
<td>wk 2-3</td>
<td>JJ</td>
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<tr>
<td>Enzyme kinetics</td>
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<tr>
<td>Interaction of enzymes with inhibitors (competitive, non-competitive)</td>
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<tr>
<td>Nucleic acids</td>
<td>wk 4</td>
<td>JJ</td>
</tr>
<tr>
<td>Drug discovery from nature</td>
<td>wk 4-6</td>
<td>JJ</td>
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<tr>
<td>Drugs from synthesis</td>
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<tr>
<td>Optimisation of lead compound, structure-activity relationships</td>
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<tr>
<td>Physicochemical properties of drugs</td>
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<tr>
<td>Drug absorption, distribution, metabolism and excretion</td>
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<td>Prodrugs</td>
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<tr>
<td>Quantitative structure-activity relationships</td>
<td>wk 7-10</td>
<td>PK</td>
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<tr>
<td>Combinatorial synthesis</td>
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<tr>
<td>Case studies (e.g. G-coupled protein receptor agonists and antagonists)</td>
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<tr>
<td>Case studies (e.g. antibacterial agents)</td>
<td>wk 10-11</td>
<td>JJ</td>
</tr>
<tr>
<td>Chemoinformatics (Guest lecture)</td>
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<tr>
<td>Discussion of sulfonamide antibacterial assays and lab report</td>
<td>wk 12/13</td>
<td>JJ/PK</td>
</tr>
<tr>
<td>Revision</td>
<td>wk 13</td>
<td>JJ/PK</td>
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<table>
<thead>
<tr>
<th>Lectures/Tuts</th>
<th>Tues 10-12</th>
<th>Fri 1-2</th>
<th>Notes/Assessment Due</th>
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<tbody>
<tr>
<td>Wk 1 March 4, 7</td>
<td>JJ</td>
<td>JJ</td>
<td>Fri 2-6 pm, preparative Lab</td>
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<tr>
<td>Wk 2 March 11,14</td>
<td>JJ</td>
<td>Lab oral</td>
<td>Fri, wet lab starts plus group oral on sulfonamides</td>
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<tr>
<td>Wk 3 March 18, 21</td>
<td>JJ</td>
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<td>Wk 4 March 25, 28</td>
<td>JJ</td>
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<td>Wk 5 April 1, 4</td>
<td>JJ</td>
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<td>Wk 6 April 8, 11</td>
<td>JJ</td>
<td>JJ</td>
<td>Group lab report and lab book by end of Fri April 11 lab class</td>
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<tr>
<td>Wk 7 April 28, 29</td>
<td>PK</td>
<td>PK</td>
<td>Pharmaceutical Agent Assignment, Tues April 28, 9am, Science Student Centre E7A</td>
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<tr>
<td>Wk 8 May 6, 9</td>
<td>PK</td>
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<tr>
<td>Wk 9 May 13, 16</td>
<td>PK</td>
<td>TEST</td>
<td>Test Fri May 16, 1 pm</td>
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<td>Wk 10 May 20, 23</td>
<td>PK</td>
<td>PK/JJ</td>
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<tr>
<td>Wk 11 May 27, 30</td>
<td>JJ/SR</td>
<td>JJ</td>
<td>Last lab class</td>
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<tr>
<td>Wk 12 June 3, 6</td>
<td>PK/JJ</td>
<td>PK/JJ</td>
<td>No Lab. Lab write-up/revision session available</td>
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<tr>
<td>Wk 13 June 10, 13</td>
<td>PK/JJ</td>
<td>PK/JJ</td>
<td>No Lab. Lab write-up/revision session available</td>
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<td>Week 14</td>
<td></td>
<td></td>
<td>Lab report and lab book, Mon June 16, 5pm, Prof Karuso, F7B232</td>
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*Timetable may be subject to change*