



THE UNIVERSITY

of ADELAIDE

SCHOOL OF MOLECULAR
AND BIOMEDICAL SCIENCE

Course Handbook for
BSc Honours
in Biochemistry

2011

Biochemistry Honours Meeting Schedule- updated February 1 , 2011
(DATES AND TIMES SUBJECT TO CHANGE, PLEASE CHECK YOUR EMAIL DAILY
THROUGHOUT THE YEAR FOR CHANGES AND UPDATES)

Monday, February 7, 2011 MLS 5th Floor Meeting Room 9:30 - 11:15 am	School Induction and Chemical Management Induction
Tuesday, February 8, 2011 3rd Floor Biochemistry Meeting Room 9:30 – 10.30 am	Biochemistry Introduction to Honours (KES), followed by Biochemistry welcome morning tea in Room 5.01.
Friday, February 11, 2011 Breakout space, MLS building 12.30pm	School wide Honours welcome lunch
Thursday , February 24, 2011 3rd Floor Biochemistry Meeting Room 2:00 - 4:00 pm (drinks 4-5 pm)	Journal Club 1 (Kirk, Paul)
Friday, March 4, 2011 3rd Floor Biochemistry Meeting Room 2:00 – 3:00pm	Workshop: How to write an ASA
Friday, March 11, 2011 3rd Floor Biochemistry Meeting Room 2:00 - 4:00 pm (drinks 4-5 pm)	Journal Club 2 (Dan, Murray, Keith)
Feb/March, 2011 Date, time and location to be advised	Workshop: Library Research Skills
Friday, March 18, 2011 Submit electronically By 5:00 pm sharp.	Written ASA due
Tuesday, March 29 and Tuesday April 5, 2011 MLS 5th Floor Meeting Room 2:00 pm - 4:00 pm	ASA Presentations
Friday, April 15, 2011 3rd Floor Biochemistry Meeting Room 2:00 - 4:00 pm (drinks 4-5 pm)	Journal Club 3 (Yeesim, Stuart)
Friday, May 6, 2011 3rd Floor Biochemistry Meeting Room 2:00 - 4:00 pm (drinks 4-5 pm)	Journal Club 4 (Grant/Briony/John)
Friday, June 10, 2011 @ 5pm sharp	Research Proposal written submissions
Monday-Friday, June 20-24, 2011 MLS 5th Floor Meeting Room Times to be advised	Research Proposal Presentations
Tuesday, July 26, and Tuesday, August 2, 2011 MLS 5th Floor Meeting Room 1:00 - 2:30 pm	Research Updates to discipline
Friday, October 28, 2011 @ 5pm sharp	Written thesis document due
Monday, November 7- Friday, November 11, 2011	Thesis Defence

MLS 5th Floor Meeting Room
Schedule to be advised

November, 2011
Details to be advised

Honours Farewell lunch

Mid-December 2011

School end of year awards dinner

Note that the workshops are not assessed, but are intended as an integral part of the professional development of your research skills during the Honours course.

GENERAL INFORMATION

Welcome to Honours in the discipline of Biochemistry. Your Honours year marks a major change in the nature of your studies. You now have the opportunity to discover new knowledge through your own research and you will have greater freedom to develop your ability to think creatively and critically. You will find Honours in Biochemistry challenging. However, you will also find it rewarding, not only because of the knowledge and skills you acquire, but also because of the friendships you develop, both with your fellow Honours students, and with laboratory and discipline colleagues over the course of the year. We wish you well and will strive as a discipline to provide an intellectual and physical environment that will support you to do your best.

The major component of the Honours year is your **Research Project**. When you commence the course you will already know your supervisor and the general nature of your project. You should discuss with your supervisor the details of your research project as soon as possible, so that you can commence laboratory work efficiently. In addition to the research project, you will participate in a series of four **Journal Clubs**, wherein you will critically examine and discuss a research paper chosen by a member of the senior staff. The third major part of the course is designed to develop and test your critical thinking, originality and ability to integrate information and ideas. This is the **Research Proposal**, where you will come up with an original, testable proposal on a topic of your choice. Once you have formulated your idea, you need to design a detailed set of experiments that can provide either evidence for or against your idea.

During the Honours course you are expected to read widely in the scientific literature, not just in the area of your research project. While it is impossible to keep abreast of the scientific literature in all areas of molecular bioscience, you should develop the habit of browsing through journals and keeping references to papers that interest you. This habit will be central to the effective development of your Research Proposal. The weekly (Tuesday 1pm, commencing in March) Biochemistry Research Reports are an important source of information and discussion. You are expected to attend these events, as well as all the various presentations given by your fellow Honours students. There are also regular School seminars and seminars by visiting speakers throughout the year, and you are encouraged to attend these. Your own laboratory will also have regular lab meetings, which are good opportunities to give regular progress reports to members of your lab in an informal setting.

Consult closely with your supervisor about the particular conditions and procedures that apply in the laboratory in which you carry out your research project. However, remember that the role of an Honours supervisor is to provide general supervision and advice and to challenge your ideas and work practices, not simply give you a list of things to do throughout the year. While you may receive quite specific advice at the beginning of your project to get you going, as the year goes on the onus will increasingly be on you to think about your project, its experimental design, appropriate controls, data analysis and interpretation. Don't be afraid to ask questions and seek help or clarification when needed, whether it is from your supervisor, other members of your lab, other researchers in the School, or indeed any scientist in the world, whom you can contact by email.

Periodically, the Honours Coordinator will use email to send you information about the course. You should check your email daily, as this will be considered the official channel of communication for Honours students about Course matters, or any changes to the schedule.

Students often become concerned at some point during the year that their research project is not progressing as they had expected. We understand that research often does not go as planned, and in fact this is a valuable lesson to learn during Honours. Be reassured that assessment of your Honours work is based on the way you carry out your research, and your ability to interpret and present your data, not on the quantity of the results themselves. Many students achieve high marks in Honours, even though their research work does not allow them to make definitive conclusions from their data. Other factors (medical, social, financial) can emerge to impinge on your progress throughout the year – please feel free to discuss any such issues with your supervisor, or with the Honours coordinator (keith.shearwin@adelaide.edu.au Ph 8303 5361). A final word about time management - it is common for students to underestimate the time needed to carry out laboratory work and also the time required to write up their results. We encourage you to plan ahead to ensure efficient use of your time and avoid a stressful, last minute rush at the end of the year; supervisors are happy to advise on timelines.

JOURNAL CLUB

Overview of journal club:

Each journal club will feature a journal article picked by the staff member(s) running that particular journal club session. In general, you will have approximately five to seven days in which to read, understand and analyze the paper. There is no written component for the journal club- you are only required to attend the Friday (Thursday for journal club 1) journal club session and be prepared to discuss the paper.

Each journal club will be “guided” by the staff members who have picked the research paper; while this guidance may vary from staff member to staff member, the role of the staff is to solicit commentary from the students, and to do so in a manner that will keep the critique of the article going in a logical and coherent manner. For example, one likely scenario is the assignment of each figure of a research paper to a pair of students. The two students assigned to figure one, for example, would be required to explain the data presented in the figure, and the students would likely start out by explaining the rationale for the experiment presented, the details of experimental setup used in the figure, and a summary of the data included in the figure. The discussion of the data might include critiques of the experimental setup, the data, and even the conclusions reached by the authors of the research paper in interpreting the data.

Given that the staff will only assign each student a task at the start of each journal club, you need to come prepared to discuss the entire paper. Each student in each journal club will be asked to present part of the research paper, so that we can fairly assess each student’s oral participation.

We are giving you only five to seven days to read and understand the paper so that you do not divert too much of your time away from your Honours research project. Your time will be best spent making sure you understand each figure in the assigned paper. To do this, make sure you comprehend the following: the rationale behind the experiment(s) presented in the figure (what is the scientific rationale that guides this experiment), the technical details of the experiment (what methods are used in the experiment; this will require you to look at other research papers to understand how the experiment works), what data is generated from the experiment, and what sort of conclusions do the researchers arrive at, given the data shown.

You will receive a mark for your oral participation in the discussion. Silence and “I don’t know” will earn very poor marks, so you should make sure you come prepared to contribute to the discussion.

***Note:** You may not be familiar with certain techniques or concepts presented in the papers assigned for journal club. In order to be successful in Honours and in a research career you will be required to develop ways to overcome this ignorance. To acquire the required level of background for a particular paper, one can read textbooks or review articles, or discuss the paper with a knowledgeable colleague. It is your responsibility to get up to speed with subject matter and methodologies in the papers. Honours will teach you the analytical and critical skills you will need to be a successful research scientist, but you will no longer be spoon-fed information; it is your responsibility to do what is necessary to understand the experimental details of a paper.*

JOURNAL CLUB ASSESSMENT

Overall, your performance in the journal club will make up 15% of your final mark; there are two components of this mark, one part for your overall oral participation and one part for your role as a discussion leader for an “element” (like a particular Figure) in the paper. Each part is worth 50% of the final 15% journal club mark.

Discussion leaders:

1. Give a brief overview of the specific Figure and/or part of the paper you have been assigned; you may also want to summarize any key findings that are made in this element. Be prepared to take the class through a discussion of the experimental approaches of this part of the paper and the key experimental findings.
2. You should be able to analyze in depth the key experiments that do the most to provide the data the authors rely on to support their conclusions.
3. Field questions from the rest of the students.
4. The main goal of the discussion leader is to help the group analyze the paper and think critically about it. Be prepared to discuss problems or deficiencies in the paper.

Participants:

1. Be familiar with the paper’s experimental methods and data. Be able to speak about the main conclusions of the paper.
2. Are the conclusions convincing in light of the evidence provided?
3. Were the experiments properly done and were appropriate controls performed?
4. Briefly outline further experiments that would clarify ambiguous results or that could test a proposed model.
5. The goal of this exercise is to critically analyze the paper and be prepared to participate in the class discussion.

RESEARCH PROPOSAL

The research proposals are intended to give students a chance to show what they can do when let loose on the biochemical literature without restriction or instruction. Students can seize on anything that interests them.

What Is Expected ?

In short, you are expected to come up with an **original, testable proposition**.

Day in and day out, the life of a research biologist involves pushing the boundaries of our understanding of how biological systems operate. In practice, advances come by paying close attention to the experimental data, constantly assessing how numerous and possibly disparate pieces of information fit together in the best possible way. This synthesis and interpretation of experimental results is essential both for the building of a hypothesis (the “proposition”) and for the subsequent design of further experiments that can, if possible, lead to an unambiguous affirmation or rejection of this hypothesis (the “testing” of the proposition). Good molecular biologists are experts in at least three areas: the interpretation of data, the formulation of propositions, and the design of experiments to test their ideas.

Since you will not generate your own data for this exercise, you will begin your proposal work by picking an area of biology that interests you deeply, and taking some time to read a number of primary and review articles in this area of research. The only prohibition on topics for the proposal are those which are closely related to your Honours field of research, or any areas of research covered by your supervisor. No precise guidance is possible here except that highest marks will only be given for a proposal that has originated from the students independent reading rather than by the surrounding research. If in doubt, consult with your Supervisor or the Honours Coordinator. Your Supervisor can discuss general issues with you, but the writing and presentation of the Proposal will be carried out without their direct assistance.

How do you start?

In the beginning, you are likely to find this exercise very difficult. This exercise is likely your first exposure to critical thinking about experimental data and experimental design, and there is no easy way to acquire the skills necessary for this exercise except by doing it directly.

While you will undoubtedly spend a lot of time identifying an acceptable original proposition, remember that there are three elements of the research proposal: 1) original, **2) testable**, 3) proposition. Once you have formulated your idea, you need to lay out a detailed set of experiments that can provide either evidence for or against your idea. A key part of the exercise is for you to gain knowledge of a range of experimental techniques— how they are performed, the technical ease or difficulty of the methods, and most importantly, the kind and the quality of the data these particular experiments generate.

A few tips:

Do not get overly concerned with finding the perfect slam-dunk, super-original “great idea.” These are rare beasts. If you do find one, you should drop what you’re doing and find a way to work on this idea for real.

Don’t get overly ambitious. While “the molecular basis of consciousness” sounds impressive, succinctly and comprehensively explaining this proposal and the experimental attack needed to confirm your ideas in ten pages is not going to happen. Try a more modest idea.

You may find in your literature search that there are many “original” propositions (meaning they are not to be explicitly found in the literature) but these propositions are “obvious” (key experiments highly suggest that hypothesis “X” is likely). These propositions are fine topics for the research proposal, but you will be held to a very high standard of experimental design for such a proposal, and you will need to present a strong and detailed experimental plan.

Many good proposals come from identifying interesting phenomenological data that lack molecular explanations.

You might challenge an existing concept or existing interpretation of published data. As you read more deeply within an area of research, you may find that multiple interpretations of data are possible. A good proposal would support a challenge of an existing theory with a detailed experimental plan.

One of the best ways to learn how to design a successful experimental plan for a set of aims is to read grant proposals.

Make sure you understand how the experiments you propose work, and be sure to indicate any pitfalls in your experimental plan and how you would address your plan if a key experimental technique were to fail.

Read successful research proposals from the previous Honours years. These proposals will be available for review.

How Long Should The Proposal Be ?

You will have a word limit of 4,800 words. As a guide, this is approximately ten typed A4 pages, double-spaced. This word limit will be strictly enforced, and you will be strongly penalised for going over this limit. A crisp presentation of four pages would be very much preferred than one padded to ten pages. We do not judge by length. A proposal should have references, and you should include reprints of the two most relevant papers when you submit your proposal.

**PDF or Word submission of the proposal is required;
the two accompanying papers should be submitted as PDFs if possible.**

Deadline for submission is Friday, June 10 by 5pm sharp.

Oral Presentation: Monday-Thursday June 20-25

The oral presentation is made to the Biochemistry discipline and should be no more than twenty minutes in length. Immediately following the presentation, you will have a more detailed discussion of your proposal with the Biochemistry Staff and invited post-doctoral fellow, for about 30 minutes.

How Long Should You Spend In Preparing The Proposal ?

From the start of your Honours year you should be reading the current research literature with a view to finding topics of interest that may, with closer investigation, provide a proposal. As a guide, it is expected that students can reasonably take 2-3 weeks away from bench work immediately before the Proposal submission.

Guidelines For The Involvement Of Others In Your Presentation

There is no doubt that honours students benefit greatly from the feedback they get from others about their offerings during the year, both from one-on-one exchanges and from activities such as a "run-thru". Others they exchange with also benefit from the opportunity to exercise their opinions on the offering. The supervisor also has the chance to perform, as education is the essence of his/her profession.

Honours students are therefore encouraged to discuss their proposal with anyone (student, staff, whoever) they can interest in their ideas. At some time the honours student will probably verbally present his/her proposal in their group (including the supervisor) for collective feedback; this is commonly known as a run-thru. Most likely the student will need a second run-thru in response to the withering comments and constant interruptions faced in the first run-thru. All this is encouraged with the proviso that the final product represents a student's distillation of the comments and criticisms they have received, rather than a "tutored" product. The first run-thru (with supervisor present) should be before the proposal is submitted, with the submission defence interim period available for a second run-thru, for further individual discussion and essentially fine timing of your presentation.

Each written proposal will be marked by two members of the Biochemistry academic staff, and one Biochemistry postdoctoral fellow. Each oral presentation will be assessed by the Biochemistry academic staff.

Please note that late submission of the proposal will incur a penalty in the form of a reduction in your mark.

RESEARCH PROPOSAL ASSESSMENT

Assessment for your research proposal is as follows:

Remember the core of the proposal is: An original, testable proposition

Written proposal: (30%)

1. Clear and concise introduction of research area, including a summary of the primary literature and outlines of key experiments
2. Succinct statement of the research proposal question (the hypothesis or proposition). There should be a clear relationship between the background material in your proposal and your hypothesis, and your hypothesis should address an important unsolved issue in the area of research you are looking at.
3. Logical outline of the proposal's aims (the experiments), with an explanation of how the data from the experiments will allow you to answer your proposal question.
4. Detailed presentation of each proposed experiment. Include the type and quality of data generated by each experiment, and be sure to mention possible experimental pitfalls, and how you would re-design or substitute another experiment if one proposed experiment fails.
5. Scholarship: appropriate referencing and attribution of data and concepts to the correct sources

Presentation delivery and content: (30%)

1. Logical flow of ideas and data; your talk will flow in roughly the same order as your written presentation
2. Pay particular attention to making sure the **logic** of your proposal is well expressed in your oral presentation. The audience should be able to see an obvious relationship between the background data and your hypothesis, and your presentation of proposed experiments and the data they will generate should clearly related back to your hypothesis.
3. Clarity, both in design of slides and in oral commentary

Question/answer period: (40%)

1. Demonstration of understanding of scientific concepts and scientific relevance
2. Demonstration of understanding of primary experimental details
3. You should be prepared to defend two essential aspects of your paper/presentation: one, your hypothesis and its scientific importance, and its scientific "originality;" two, your choice of experiments, and specifically if the experimental design of your proposal will allow you to give a definitive answer to your hypothesis.

THESIS RESEARCH

Aim, Significance And Approach - The ASA'

Your Supervisor will likely give you a written page or so describing the aim of your project, the overall approach and suggesting the first experiment to start you off. On **Friday, March 18**, you will submit electronically a written statement of the aim of your research project, its significance to the Group's research (if appropriate) and to the field in general, and finally the approach to be followed. **PDF or Word submission of the proposal to the Honours coordinator is required.**

Your Supervisor will be available to help in the drafting of your ASA. While there is no set format or length, a well thought out and carefully crafted ASA can be enormously helpful in focusing your thoughts about the project.

Staff thesis examiners, who will also read your ASA, will be assigned before your oral ASA presentations, in late March/early April. Once this assignment has been made, you are encouraged to set up an informal meeting with your examiners and discuss your aims and experimental approach.

It is appreciated that a "feeling" for your research problem will be better later in the year, but the ASA exercise is scheduled at this time in order to encourage a significant early awareness of what you are doing and why. There is no assessment.

Research

Each Honours student is under the supervision of a member of staff on an assigned topic. You will probably find that life in a research laboratory is quite different from what you expect. Since you will become a member of a research group, you will be given help and advice by your Supervisor and other group members, more or less every day, but especially at the beginning of the year. We encourage you to talk about your research project freely with other members of the Group and also with other members of the Discipline.

You are asked to present a formal twenty minute **Research Update** during July/August to the Biochemistry Discipline. This will not be assessed. The aim here is to give you experience at presenting the results and problems of your own research project and to gain as much benefit as possible from helpful discussion and comments from the audience. This exercise also presents an ideal opportunity to write a first draft of the Introduction for your thesis.

Thesis Preparation

Results of your research project are to be submitted in a thesis to be typed on A4 paper and bound. The Discipline will supply bond paper, photographic paper if necessary, and pay for the cost of three photocopies and the binding of three copies, one of which is yours to keep. The Discipline may also make a contribution towards expenses incurred in the production of your thesis.

The thesis will include an Introduction that will contain the background to, and the significance of, the problem. Only relevant material should be included. The results section should contain your data and its interpretation. The final chapter thesis should contain a summary. We will give you more detailed specifications for writing the thesis later in the year. You are required to submit the electronic version of your thesis by **Friday, October 28 at 5pm sharp**, with the bound copies to be distributed to the thesis examiners the following week.

Your thesis document will be examined by two staff members other than your Supervisor and one postdoctoral fellow. You are asked to present your thesis orally during the period **November 7-11**. It is usual for each student to summarise the results of their year's work and to consider their achievements in terms of the original aims of the work. This examination will start with a short presentation (20-30 min) which is open to anyone in the School wishing to attend. The rest of the time (~30 minutes) involves a session open only to the Biochemistry senior staff and invited post-doctoral fellows, where questions from the three thesis examiners and senior staff will be addressed. These questions are usually on points of clarification, on background details of work, either from your laboratory or from the literature, and on the future development of your problem.

Please note that late submission of the electronic version of the thesis will incur a penalty in the form of a reduction in your mark.

THESIS ASSESSMENT

Assessment and Feedback:

Assessment for the written thesis: (60%)

1. Demonstrate knowledge of the experimental literature that forms the foundation of the thesis project; formation of a coherent and logical hypothesis that drives the thesis work.
2. Detailed documentation of the materials and methods for the thesis experiments. Use lists and tables where appropriate.
3. Comprehensive and logical arrangement of experimental results; figures and diagrams should support the written explanation of the experimental results. All major experimental findings should be documented with the appropriate experimental evidence. Use the appropriate statistical tests to analyse your data.
4. The discussion should examine the experimental results in the broader context of the available scientific literature; scientific conclusions should be supported by clear and logical argument. Troubleshooting should be data-based and concrete suggestions should be made for ways to overcome failed experiments. Future experiments should address deficiencies in the current data and their set-up and predicted data should be clearly spelled out.
5. Thesis writing and formatting: The thesis should be grammatically correct, and should avoid jargon and “scientific shorthand” For example, don’t write “oligo” when you mean “oligonucleotide.” The thesis should be formatted to aid easy navigation, using chapters for major divisions (Introduction, Results, etc.), and sections and subheadings for divisions within chapters. Figures for the thesis should be clearly labelled (proper lane markers on gels, etc.) and each figure should have a Figure Legend that should completely explain the figure apart from the text.
6. Presentation scholarship: appropriate referencing and attribution of data and concepts to the correct sources should be applied throughout the thesis. Data from the Honours student’s laboratory but not generated from the student should be clearly marked.

THESIS PRESENTATION ASSESSMENT

Assessment for the Oral presentation and Q&A period: (40%)

Presentation delivery:

1. Logical flow of ideas and data
2. Clarity, both in design of slides and in oral commentary
3. Generation of audience interest (excitement of speaker, clarity, jokes, etc.)

Presentation content:

1. Demonstration of understanding of the background to the thesis work and the experimental details of the current work
2. Demonstrate understanding of the significance of the work (the “so what?” factor)
3. Success at condensing the year’s experimental details into a summary of the important aspects of the thesis work
4. Presentation scholarship: appropriate referencing and attribution of data and concepts to the correct sources

Question/answer period:

1. Demonstration of understanding of scientific concepts and scientific relevance
2. Demonstration of understanding of primary experimental details

Supervisor’s mark

You will be given a mark by your research supervisor that covers your performance in the lab. Supervisors are given wide latitude in deciding how to assess each of their students so check with your supervisor on the criteria he/she will use to mark your research work.

Final marks and ranking

Your final mark is determined by the following four assessments:

Journal club participation–	15%
Research proposal & defence–	25%
Thesis & thesis defence–	45%
Supervisor’s mark–	15%

Your final mark is the weighted sum of the individual marks as listed above. The final ranking (but not the individual scores) will be listed publicly on the 3rd floor bulletin board.

Marking of Honours Students

As laid out in the Honours book, there are four assessments for each Honours student, with the following weights:

Overall mark for Journal Club participation:

Oral participation–	50% of final journal club mark
Discussion leaders–	50% of final journal club mark

Overall mark for Research Proposal & defence:

Written proposal–	30% of final research proposal mark
Oral delivery of proposal–	30% of final research proposal mark
Question and answer period– (proposal defence)	40% of final research proposal mark

Overall mark for Thesis & Thesis Defence:

Written thesis–	60% of final thesis mark
Oral defence and Q&A–	40% of final thesis mark

Supervisor's mark:

The supervisor's mark is given for performance in the Honours research project, and includes an assessment of the quality of the bench work, intellectual engagement with the project, making suggestions for alternative approaches/experiments, taking the initiative in problem solving/troubleshooting, the participation of the student in the life of the lab, including lab meetings, journal clubs, etc. The supervisor's mark will be submitted to the Honours coordinator prior to the final thesis presentations.

For each individual mark, the Discipline of Biochemistry uses a scale of 1-10, with the following conversions to the Honours grading scale:

9.50	Top I
9.00	Mid I
8.50	Low I
8.00	Borderline
7.50	Top 2A
7.00	Mid 2A
6.50	Low 2A
6.00	2B

Each staff member derives a mark according to the stated assessment criteria developed for each assessed activity; intermediate marks can be (and are) given; thus a mark of 8.35 is perfectly acceptable. The final marks for each assessment and the final course mark are calculated according to the above weights. We DO NOT use any quota system for scaling the final marks.

Students who are accepted into the Biochemistry Honours program have already shown high levels of academic and/or other achievement, and we expect (and history has shown) that the majority of students in the program will be capable of achieving Second Class Division A. This result, which requires that you work at a consistent very high standard, is itself an excellent achievement, and students with this mark will have a very good chance of winning scholarship support, should they wish to pursue a PhD program by Research in the School. In the past, some students who have worked consistently throughout the year have been disappointed that they have not been awarded First Class Honours. This grade is reserved for outstanding students who have shown a consistent high level understanding of their research areas, a high degree of initiative and independent thinking, and well-developed skills in scientific communication.

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