THE UNIVERSITY OF NEW SOUTH WALES
SCHOOL OF BIOTECHNOLOGY AND BIOMOLECULAR SCIENCES
BABS3121 MOLECULAR BIOLOGY OF NUCLEIC ACIDS

SESSION 1, 2017

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Practical Manual (and appendices) will be uploaded into LabArchives, the online lab notebook that you will be using for recording of your experimental results and note taking during the laboratory.
COURSE STAFF
Co-ordinators:
A/Prof. Noel Whitaker 	Room 241D 	Phone 9385 2041 	n.whitaker@unsw.edu.au
Dr. Michael Janitz 	Room 329A 	Phone 9385 8608 	m.jantiz@unsw.edu.au

Other Lecturers
Prof. M. Crossley
A/Prof. V. Murray
A/Prof L. Lutze-Mann
Dr. R. Edwards
Dr. F. Delerue
Dr. A. Todd

Technical Officers/tutors
Dr. Elessa Marendy

COURSE INFORMATION

BABS3121 Molecular Biology of Nucleic Acids is an undergraduate course worth six units of credit.

The syllabus comprises a detailed analysis of gene structure and function that includes: structure and properties of DNA and RNA; structure of chromatin; regulation of DNA replication; control of transcription and translation; DNA repair and the molecular biology of cancer induction; RNA biology; recombinant DNA technology; application of genomics and proteomics; site-directed mutagenesis; microarray analyses; protein production using recombinant DNA systems. Practical work is a major part of the course. The practical component illustrates and complements the lectures and provides experience with contemporary molecular techniques.

Lecture Times: 
Wednesday 5pm – 6pm AND Friday 1 - 2 pm

Practical Class: 
Thursday 9am - 1 pm OR Thursday 2pm - 6 pm

Textbook: 
Alberts et al., Molecular Biology of the Cell, 5th ed. (Garland, 2008)
OR
Watson et al., Molecular Biology of the Gene, 7th ed. (Benjamin Cummings, 2013)

Molecular cell focus
Molecular genetics focus

COURSE AIMS
The overall aim of the course is to provide a solid foundation in molecular techniques as well as an introduction to informatics-based methods from which students can pursue future work in industry or academia (including Honours projects). This course complements and supports other BABS courses. Weekly practical sessions provide exposure to procedures used in the routine manipulation and analysis of DNA and associated products (including RNA and proteins).

Aims:
• Create an environment for student engagement and motivation
• Student application of their learning to real-life problems
• Provide a solid foundation for further nucleic acid work
• Promote UNSW graduate attributes including team work

STUDENT LEARNING OUTCOMES
Some of the skills the course will aid in developing include:
• the ability to critically evaluate scientific literature,
• the capacity for innovative and original thinking,
• creative problem-solving; the skills associated with carrying out experimentation associated, with nucleic acid and protein purification, and the critical analysis of data,
• self-learning techniques, including independent and reflective learning and;
• working in a group dynamic, refining communication skills and self-learning techniques.
<table>
<thead>
<tr>
<th>Week</th>
<th>Commencing</th>
<th>Wed 5 – 6pm Webster Theatre A (B16)</th>
<th>Fri 1 – 2pm Old Main Building (OMB) Room 149</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feb 27</td>
<td>Intro to BABS3121 (NW)</td>
<td>Basic Techniques (MJ)</td>
</tr>
<tr>
<td>2</td>
<td>March 6</td>
<td>Basic Techniques (MJ)</td>
<td>Basic Techniques (MJ)</td>
</tr>
<tr>
<td>3</td>
<td>March 13</td>
<td>Transcription/Control of gene expression (MC)</td>
<td>RNA Biology (ncRNA) (MJ)</td>
</tr>
<tr>
<td>4</td>
<td>March 20</td>
<td>Transcription/Control of gene expression (MC)</td>
<td>Transcription/Control of gene expression (MC)</td>
</tr>
<tr>
<td>5</td>
<td>March 27</td>
<td>Transcription/Control of gene expression (MC)</td>
<td>The Transcriptome (RE)</td>
</tr>
<tr>
<td>6</td>
<td>April 3</td>
<td>The Transcriptome (RE)</td>
<td>The Transcriptome (RE)</td>
</tr>
<tr>
<td>7</td>
<td>April 10</td>
<td>The Transcriptome (RE)</td>
<td>Good Friday - Break</td>
</tr>
<tr>
<td>8</td>
<td>April 24</td>
<td>Mid-session Exam</td>
<td>Replication, Repair &amp; Cancer (LLM)</td>
</tr>
<tr>
<td>9</td>
<td>May 1</td>
<td>Replication, Repair &amp; Cancer (LLM)</td>
<td>Replication, Repair &amp; Cancer (LLM)</td>
</tr>
<tr>
<td>10</td>
<td>May 8</td>
<td>Replication, Repair &amp; Cancer (LLM)</td>
<td>DNA structure/damage (VM)</td>
</tr>
<tr>
<td>11</td>
<td>May 15</td>
<td>DNA structure/damage (VM)</td>
<td>Catalytic Nucleic Acids (AT)</td>
</tr>
<tr>
<td>12</td>
<td>May 22</td>
<td>Viral Vectors (NW)</td>
<td>Future applications (MJ)</td>
</tr>
<tr>
<td>13</td>
<td>May 29</td>
<td>No lecture</td>
<td>No lecture</td>
</tr>
</tbody>
</table>

NW: A/Prof. N. Whitaker, MJ: Dr Michael Janitz, MC: Prof. Merlin Crossley, RE. Dr. Richard Edwards, LLM: A/Prof. Louise Lutze-Mann, VM: A/Prof. V. Murray AT. Dr Alison Todd
# PRACTICAL SCHEDULE

**Laboratory Times:**
- Thursday 9am – 1pm OR 2 – 6pm

<table>
<thead>
<tr>
<th>Week</th>
<th>Commencing</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feb 27</td>
<td>No Lab</td>
</tr>
<tr>
<td>2</td>
<td>March 6</td>
<td>Estimation of DNA Concentration and Purity Site-directed mutagenesis (SDM) I</td>
</tr>
<tr>
<td>3</td>
<td>March 13</td>
<td>Site-directed mutagenesis II</td>
</tr>
<tr>
<td>4</td>
<td>March 20</td>
<td>Site-directed mutagenesis III</td>
</tr>
<tr>
<td>5</td>
<td>March 27</td>
<td>Site-directed mutagenesis IV (review) GFP Expression Analysis I</td>
</tr>
<tr>
<td>6</td>
<td>April 3</td>
<td>GFP Expression Analysis II</td>
</tr>
<tr>
<td>7</td>
<td>April 10</td>
<td>GFP Expression Analysis III Synthesis of CRISPR/CAS9 guides for the generation of KO mice I</td>
</tr>
<tr>
<td>8</td>
<td>April 24</td>
<td>Synthesis of CRISPR/CAS9 guides for the generation of KO mice II Microarray I (computer prac)</td>
</tr>
<tr>
<td>9</td>
<td>May 1</td>
<td>Microarray II</td>
</tr>
<tr>
<td>10</td>
<td>May 8</td>
<td>Microarray III</td>
</tr>
<tr>
<td>11</td>
<td>May 15</td>
<td>Microarray IV</td>
</tr>
<tr>
<td>12</td>
<td>May 22</td>
<td>Microarray Poster presentations</td>
</tr>
<tr>
<td>13</td>
<td>May 29</td>
<td>No lab</td>
</tr>
</tbody>
</table>

*REMINDER:* the **two** experiments/presentations in bold type are assessable. The **Site-directed mutagenesis experiment** requires a written report to be submitted by the end of your prac session in week 7. For details of the report, see next page. The **Microarray** experiment is presented as a poster and is assessed in your prac session in week 12.

## EXPECTATIONS OF STUDENTS FOR PRACTICAL WORK

The **Site-directed mutagenesis** experiment requires a written assessment to be submitted. Written reports should follow the usual format of Introduction, Methods, Results and Discussion. In most cases ‘Methods’ can be covered simply by saying ‘as described in the practical notes’, and then listing any significant variations. Marks will mainly be awarded for clear presentation of results, with the inclusion of sample calculations where appropriate. The discussion should include an interpretation of the results, and your assessment of whether the results are reliable. If the experiment failed to yield the expected result the possible reasons for this should be discussed along with assumptions that have been made in interpreting the results etc. In general the reports that score the highest marks will be those that are clear, complete and concise. (You shouldn’t take the time to write too many pages and we don’t have the time to read them!).

The laboratory practical **Microarray** results will be presented as a poster. See details in practical manual.

In addition to the written reports, all students should equip themselves with a laptop or borrow one of the SurfacePros to access LabArchives in which to record details of experiments **as they are**
carried out and to record results as they are obtained. LabArchives should also be used to record information provided by the demonstrators in talks introducing experiments or as experiments progress, to write answers to questions asked in the practical notes and to keep a record of experiments run as demonstrations.

Deadlines to remember:
- Week 7: Submission of Site-directed mutagenesis report – End of your prac session on Thursday 13 April.
- Week 8: Mid-session examination (Wednesday 26 April)
- Week 12: Poster presentation on Microarray experiment (Your prac session on Thursday 25 May)

Occupational Health and Safety
OH&S issues are covered later in separate sections.

**ASSESSMENT**

<table>
<thead>
<tr>
<th><strong>Mid-session exam</strong></th>
<th>45 min paper</th>
<th>Wednesday 26 April (week 8)</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Held during Wednesday lecture time slot (essay/short answer questions on lecture topics up and including “Transcription/Control of gene expression” (MC))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Final written exam</strong></th>
<th>2 hour paper</th>
<th>Session 1 exam period</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Held during exam week (essay/short answer questions on lecture topics from and including “The Transcriptome” (RE))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Practical work assessment</strong></th>
<th>2 assessments</th>
<th>Written SDM report (15%) Thursday 13/4/17, AND Microarray poster (15%) Thursday 25/5/17</th>
<th>30%</th>
</tr>
</thead>
</table>

**USE OF LabArchives ELECTRONIC NOTE BOOK FOR PRACTICAL WORK**
For this course, we require students to record their results, observations in the LabArchives electronic notebook. LabArchives is an Electronic Lab Notebook used by scientists at leading research institutions around the world to document and share their research. We have chosen to use the Classroom Edition of LabArchives for the practical component of this course. LabArchives is a web-based notebook specifically designed for recording and time stamping any changes. The Practical Manual will be available through LabArchives so will not need to bring paper copies into the laboratory.

To use LabArchives, you will need to bring your own laptop or borrow a SurfacePro from us (Student ID required as a marker). You can access LabArchives on your smart phone but, of course, it is small and difficult to enter information.

**LabArchives - Quick Start Guide for Students**
This guide provides an overview of the key LabArchives functions to get started. If you have any questions, check LabArchives’ Help pages and User Forums, ask your demonstrator, or write to our support team (support@labarchives.com). Alternatively you can follow the advice on the LabArchives video (https://www.youtube.com/watch?v=bNwCYw2jMaw&t=2s&list=PLB32BF93AEA6F9DA7&index=5).

### Accessing your LabArchives Notebook

The link to activate your LabArchives account is https://au-mynotebook.labarchives.com/

- Look for the link on the course webpage or in a welcome e-mail from LabArchives.
- You must use your new style email address*
- Thereafter, you can log in using most any browser from www.labarchives.com
- If you have a tablet or smart phone, try the free app for iOS or Android devices.
- The name of your course notebook will appear under the Notebook Navigator.

*If you already have a LabArchives account (from previous years), linked to the old-style student emails (i.e. zXXXXXXX@student.unsw.edu.au) then you’ll need to log in with that old email address/password and then change your password to your new style email account (i.e. zXXXXXXX@unsw.edu.au).

### Adding new Entries to your Notebook

We will usually provide some structure and content to the course notebook. If you need to add a new “entry” to any page in your notebook, click on the desired page or create a new page. Then, you can click and drag your computer file to this page or use the “Add Entry” menu at the top of the page to choose the type of entry. These are the most common entry types in LabArchives:

- **Rich Text:** A word processor built into LabArchives. It allows special formatting, embedding images, links, tables, etc.
- **Attachment:** Any file format can be uploaded. For MS Office documents or PDFs, a thumbnail preview is shown. Most image formats such as a .jpg, .gif, .tiff, .bmp and other recognized file types will also appear as a thumbnail.
- **Office Document:** Create a Microsoft Office-compatible document online - MS Word, PowerPoint or Excel file.
- **Heading:** Allows you to divide a Notebook Page and to make it more readable and visually appealing.
- **Plain Text:** Also a word processor but for simple text when no stylistic attributes are needed.
- **PubMed Ref:** Import and store references directly from PubMed. A pop-up window will appear to perform a search.
- **Widget:** Customizable apps or data forms that can be used for many purposes (eg. calculator, periodic table, etc )

### Editing an Entry

To edit an existing entry, move your cursor over the entry and select “edit” from the small menu that appears. If you want to upload a new version of an existing file, click the edit link for the old version then drag and drop the new version onto the page. Click on “Save to page” and the newer version will appear while the older version is preserved in the revision history.

*Note that even if you click on the delete link, any data added to your notebook cannot be deleted. Each action is logged and can be reversed by the “Page Tools: Revisions” menu on the top right of the page.

### Reviewing Past Versions of Pages or Entries
As is good lab practice, LabArchives stores every revision of every entry – whether it is a text entry, a spreadsheet, widget, or any other type of attachment. Each version is stored with a corresponding date and time stamp. To see past revisions, simply click on “revisions” from the entry or page-level menu.

In here, a summary of all versions appears. For group projects, it can be useful to see who did which action at what time. Additionally, the hyperlink on the left provides access to any older versions. Once uploaded, your data can never be lost.

For example:

<table>
<thead>
<tr>
<th>Date and Time</th>
<th>Entry version #</th>
<th>Revised by IP</th>
<th>Revision Action</th>
<th>Data Type</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 12, 2014 @07:15 AM PDT</td>
<td>6</td>
<td>70.168.50.55</td>
<td>edited</td>
<td>page name</td>
<td>7 Bytes</td>
</tr>
<tr>
<td>May 09, 2014 @12:21 PM PDT</td>
<td>5</td>
<td>70.168.50.55</td>
<td>reverted to earlier version</td>
<td>page name</td>
<td>version 1</td>
</tr>
<tr>
<td>May 09, 2014 @12:19 PM PDT</td>
<td>4</td>
<td>70.168.50.55</td>
<td>reverted to earlier version</td>
<td>page name</td>
<td>version 1</td>
</tr>
<tr>
<td>May 07, 2014 @12:33 PM PDT</td>
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<td>widget entry</td>
<td>335 Bytes</td>
</tr>
<tr>
<td>May 07, 2014 @12:32 PM PDT</td>
<td>2</td>
<td>70.168.50.55</td>
<td>edited</td>
<td>widget entry</td>
<td>234 Bytes</td>
</tr>
</tbody>
</table>

Sharing / Group Projects

When working on group lab projects, LabArchives provides several options:

- If we have given you sharing privileges, right click on a page (Ctrl+click for Mac) or folder that you want to share with your group and click on “share.”
- In the new menu, add the e-mail of group members (separated by commas). They will have read-only access unless you change it to read-write (edit) privileges.

- If you are taking pictures during an experiment, you can give group members access to your page with those images. If they need a copy in their notebook, they can download them to their computers and upload them to their accounts. *Tip: the mobile app can upload photos to several notebooks.*

- Alternatively, you or your demonstrator can create a new notebook for a short term group project and invite the members (& TA) to access it through the “Notebook User Management” menu under “Notebook Settings.”
Submitting an Assignment to your Instructor
We may choose to embed an Assignment Entry (as shown below) in your notebook. These entries are meant to instruct you about assignments that need to be “turned in.” If you find an entry like this, you will be expected to submit it to the demonstrator for grading. Once you’ve completed and saved your work, simply click on “edit” to change the assignment status to “Submitted to Instructor” and save.

Viewing Comments/ Grades
In addition to seeing comments left by your demonstrator (comment cloud at the top right of every entry), it is possible that you will be provided a grade for your entry. After your entry been reviewed, you will see a new row at the bottom labeled Grades. To see a summary of all your assignment grades, you can go to the “Utilities” menu & choose “View Grades.” It is unlikely we’ll use this feature in BABS3121 this year.

Notifications
Because your demonstrator can add content or comments to your notebook, keep track of these updates by looking at the notification icon at the top right of your account. The number inside the red box indicates the amount of updates your demonstrator or group members have made to your notebook.

Tip: Be sure to click on these so that you are aware of any changes that are made in the course.

Annotating an Image
When you are asked to annotate an image, you will notice that most image files have a LA Docs menu with the option to “View Online/annotate /rotate” (as shown below the image). You can download the file if you prefer to use another program to annotate, but you can save time by using the LabArchives integrated image annotator instead.

On the LabArchives annotator page, there are several tools to help you annotate the image. Each of the icons are described below:
Allows you to save your annotations directly to your notebook.

Allows you to draw freehand on the image.

Allows you to draw straight lines and arrows on the image.

Allows you to create a circle which can be filled in or kept empty (transparent) using the fill/opacity tool.

Allows you to create rectangles. It can also be filled in or kept empty.

Allows you to create shapes that can be filled in or kept empty by using the fill/opacity tool.

Allows you to move any item that has been added on the image anywhere.

Allows you to remove any item that has been added onto the image.

Allows you to add text anywhere in the color of your choice.

Using Widgets

Widgets can extend the capabilities of LabArchives notebooks as custom forms or apps. We may utilize these into your notebook. To complete a widget form, you will need click “edit” to add data and “save” once completed.

Below are sample widgets that include the Chemical Sketcher Entry Widget and a simple student information tablet.
To use a widget for quick reference (such as a calculator or chemical hazard widget), click the options menu (3 bars) on the top right and choose Widgets -> More. If you want to embed a widget in your notebook as a new entry, click on “Add entry: widget” and select the widget you would like to use.

**Microsoft Office Plug-in**

If you are using Microsoft Office on your Windows machine, you may consider using the LabArchives’ office plug-in that integrates Office with LabArchives. This plug-in allows users to work on documents through Microsoft Office and have it directly saved into their LabArchives notebooks. You can download the MS Office plug-in from the “Downloads” section of the main menu (≡). When you sign in for the first time, you will be prompted to provide your LabArchives credentials.

If you are asked to login, ensure that you login to [https://au-mynotebook.labarchives.com/](https://au-mynotebook.labarchives.com/) rather that the default USA site.

**Creating a PDF or HTML backup / printing pages**

LabArchives also allows you to create a PDF or HTML copy of your notebook anytime. Simply go to the top-right menu, then Utilities → Notebook to PDF or Create Offline Notebook. Once the process is complete, you will receive an email of a link to download the completed file.

Tip: Even if you continue to use LabArchives next semester, download your notebook to obtain a portable ePortfolio of your lab work. It may be useful when you apply for an internship, job, or graduate school!

If at any time during the course you need to print a single page or entry from your lab notebook, choose “print” from the Page tools menu or select “print” from the entry menu like below.

**Website**

[www.labarchives.com](http://www.labarchives.com)
Written assessments and presentations will be assessed according to Biggs’s SOLO taxonomy. Biggs’s SOLO approach to learning has 5 types of response to the assessment and these will be applied to the final exam. The figure below gives an idea of what is required to achieve different types of grade:

<table>
<thead>
<tr>
<th>SOLO Type of Response</th>
<th>Mark region</th>
<th>Grade Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Prestructural</td>
<td>&lt;40</td>
<td>F</td>
</tr>
<tr>
<td>II Unistructural</td>
<td>40-50</td>
<td>F – P</td>
</tr>
<tr>
<td>III Multistructural</td>
<td>51-64</td>
<td>P</td>
</tr>
<tr>
<td>IV Relational</td>
<td>65-80</td>
<td>C – D</td>
</tr>
<tr>
<td>V Extended Abstract</td>
<td>81-100</td>
<td>D – HD</td>
</tr>
</tbody>
</table>

An answer that relies upon information provided during the lectures and simply ‘regurgitates’ this information will at most be awarded a mark of 40-50, i.e. a ‘unistructural’ response. The student has failed to demonstrate adequately a firm understanding of the principles and their application as required in the examination question. An incorrect answer, where it appears the student is unclear of the principles is more likely to be considered as a ‘prestructural’ answer and will result in a mark of less than 40.

A correct answer using information provided during the lecture corresponds to a ‘multistructural’ response. The answer suggests an understanding of the principles and limited information to support the answer. In contrast, a correct answer using lecture information, but supported by strategic references would demonstrate a firm understanding of the principles and the use of information to explain the concepts and applications. This is considered as a ‘relational’ response. The best answer possible will not only demonstrate a firm understanding of the principles and their applications, but also the implications in the wider context of the field, as they relates to the question, i.e. ‘extended abstract’.

The best way to demonstrate and ‘extended abstract’ answer is to include relevant information you have read from scientific journals/sources.

ACADEMIC HONESTY AND PLAGIARISM
Plagiarism is the presentation of the thoughts or work of another as one’s own.* Examples include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person’s assignment without appropriate acknowledgement;
- paraphrasing another person’s work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.
The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.
† Adapted with kind permission from the University of Melbourne.
Avoiding Plagiarism

To use someone’s words or ideas in your work without acknowledging where they came from is a form of theft called plagiarism. You can avoid plagiarism by following these suggestions.

The Golden Rule of Avoiding Plagiarism: Make sure your assignments are referenced correctly
Most academic work draws on the words, information and ideas of other writers. Referencing is a system that allows you to acknowledge the contribution of other writers in your work. Whenever you use words, ideas or information from other sources in your assignments, you must cite and reference those sources.

Referencing
There are several referencing methods. Short referencing guides for commonly used styles are available from The Learning Centre. Commonwealth Style Guides for other referencing systems are available at many libraries and bookshops.

Follow the referencing style recommended by your faculty. Many faculties or schools within the University offer guides indicating how referencing should be done. Check with your lecturer or tutor about their preferred method.

Why Reference?
Inaccurate references or—worse still—no references at all can be regarded as plagiarism. All University assignments must contain references: an unreferenced essay implies every word, idea and fact is your own work, so beware!

References must always be accurate; your tutor/lecturer should be able to trace your sources. The best way to make sure you reference accurately is to keep a record of all the sources you used when reading and researching for an assignment. Write down the bibliographical information and the library call number (in case you need to find a book again).

Common Forms of Plagiarism
From Obvious to More Subtle*

Copying an essay from another student and submitting it as your own work
Copying a journal article or a section of a book and submitting it as your own work
Copying sentences or paragraphs from someone else (essay, article, book, lectures, etc.)
Quoting from a source (word for word), without using quotation marks or proper acknowledgment is plagiarism.

Using significant ideas from another author without acknowledgement
Putting someone else’s ideas into your own words and not acknowledging the source of the ideas is plagiarism.

Heavy reliance on the written expressions of someone else without proper acknowledgment
Lifting sentences or paragraphs from someone else, without using quotation marks, but with proper acknowledgment. Here the impression is that the idea or information comes from the source cited, but that the phrasing, the choice of words to express it, is your own contribution.

Excessive reliance on other people’s material
Avoid repeated use of long quotations. Too many direct quotations (even with quotation marks and with proper acknowledgment) result in your sources speaking for you, meaning your own contribution is minimal. Use your own words more and rely less on quotations.

(* We are indebted to the UNSW School of Political Science for this discussion of plagiarism)
(Illustration source: Burdess, N., The Handbook of Student Skills, 1991, Prentice Hall, Australia)
SPECIAL CONSIDERATION AND FURTHER ASSESSMENT
SEMESTER 1 2017

Students who believe that their performance, either during the session or in the end of session exams, may have been affected by illness or other circumstances may apply for special consideration. Applications can be made for compulsory class absences such as (laboratories and tutorials), in-session assessments tasks, and final examinations. Students must make a formal application for Special Consideration for the course/s affected as soon as practicable after the problem occurs and within three working days of the assessment to which it refers.

Students should consult the “Special Consideration” section of Moodle for specific instructions related to each BABS course they are studying. Further general information on special consideration can also be found at https://student.unsw.edu.au/special-consideration.

HOW TO APPLY FOR SPECIAL CONSIDERATION
Applications must be made via Online Services in myUNSW. You must obtain and attach Third Party documentation before submitting the application. Failure to do so will result in the application being rejected. Log into myUNSW and go to My Student Profile tab > My Student Services channel > Online Services > Special Consideration. After applying online, students must also verify supporting their documentation by submitting to UNSW Student Central:

- Originals or certified copies of your supporting documentation (Student Central can certify your original documents), and
- A completed Professional Authority form (pdf - download here).

The supporting documentation must be submitted to Student Central for verification within three working days of the assessment or the period covered by the supporting documentation. Applications which are not verified will be rejected.

Students will be contacted via the online special consideration system as to the outcome of their application. Students will be notified via their official university email once an outcome has been recorded.

SUPPLEMENTARY EXAMINATIONS:
The University does not give deferred examinations. However, further assessment exams may be given to those students who were absent from the final exams through illness or misadventure. Special Consideration applications for final examinations and in-session tests will only be considered after the final examination period when lists of students sitting supplementary exams/tests for each course are determined at School Assessment Review Group Meetings. Students will be notified via the online special consideration system as to the outcome of their application. It is the responsibility of all students to regularly consult their official student email accounts and myUNSW in order to ascertain whether or not they have been granted further assessment.

For Semester 1 2017, BABS Supplementary Exams will be scheduled on:

- All BABS coded courses (except BABS1201): Wednesday 12th of July
- All BIOC coded courses: Thursday 13th of July
- BABS1201 and MICR-coded courses: Friday 14th of July

Further assessment exams will be offered on this day ONLY and failure to sit for the appropriate exam may result in an overall failure for the course. Further assessment will NOT be offered on any alternative dates.
EQUITY AND DIVERSITY
Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course coordinator (details on page 2) prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or www.equity.unsw.edu.au/disabil.html). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

LECTURE SUMMARIES

1. INTRODUCTION TO THE COURSE AND PRACTICAL WORK (1 lecture NW)
   Overview of the course, the practicals and OHS.

2. BACKGROUND MOLECULAR BIOLOGY (3 lectures - MJ).
   References:
   Course text book
   BIOC2201 lectures
   BABS3121 lab manual notes (Appendices)
   i) Theoretical Background to Laboratory Techniques used in Practical Work
      DNA cloning, PCR and its variations, Vectors
   ii) Primary, secondary and tertiary structure of DNA.
      The interaction of proteins with DNA, Basis for the sequence specific recognition of DNA by proteins, Hybridisation
   iii) Chromatin structure
      The structure of the nucleosome. The effect of chromatin structure on the control of gene expression
   iv) The organisation of genes in humans.
      Repetitive sequences. Important elements in chromosomes.

3. TRANSCRIPTION AND THE CONTROL OF GENE EXPRESSION (4 Lectures - MC).
   References:
   Alberts et al., Molecular Biology of the Cell, 5th ed. Portions of Chapters: 4, 5 & 7
   i) How genes are turned on and off at the transcriptional level
      How DNA-binding proteins control RNA polymerase binding
      How DNA-binding proteins were discovered
      How they find their target genes
      How they turn them on or off
      How is this regulation maintain this for long periods
   ii) Regulatory proteins
      How were DNA-binding proteins and their genes identified?
      What can be done with these genes?
      How have things changed in the post-genomic era?
   iii) Mechanism of action of regulatory proteins
      What we have learned about DNA-binding from studying transcription factors
      What have we discovered about activation and repression and repression domains
      What functional domains actually do and how this leads to epigenetics
   iv) Transcription factors in development
Loss of function experiments
Gain of function experiments
Analysis using genomic techniques

4. NON-CODING RNAs AND THEIR FUNCTIONS (1 lecture – MJ)
   i) Translation
      Ribosomal RNA (rRNA) and snoRNAs
      Transfer RNA (tRNA)
   ii) mRNA processing and splicing
      Heterogenous nuclear RNAs (hnRNAs)
      Intron splicing
   iii) Post-translational gene silencing
      Catalytic ncRNAs (Ribozymes)
      RNA interference (RNAi)
   iv) RNA directed transcriptional gene silencing
   v) LncRNA, sncRNAs and piRNA

5. THE TRANSCRIPTOME (4 lectures – RE)
   References:
   Alberts et al., Molecular Biology of the Cell, 5th ed. Portions of Chapter: 7
   i) Transcriptomics
      What is transcriptomics?
      Differential expression
      DNA microarrays
      Single cell arrays
      Sequence-based transcriptomics
      Gene Expression qPCR
      RNASeq
   ii) Differential gene expression
      Clustering samples by gene expression
      Identifying differentially expressed genes
      Normalising gene expression

Week 8 - MID-SESSION EXAM

6. REPLICATION, REPAIR AND CANCER (4 Lectures - LLM).
   References:
   i) DNA replication mechanisms, including initiation and completion of replication.
      The proteins and enzymes involved in replication; Comparison of prokaryotic and eukaryotic DNA replication systems. The replicon model of replication initiation; initiation of replication and its control in the cell cycle, replication of telomeres.
   ii) DNA repair.
      Replication errors and their repair; DNA damage and its repair; excision repair; recombinational repair; repair deficiencies.
   iii) Cancer
      The role that DNA damage, carcinogens, somatic mutations, epigenetic changes and
genetic instability play in the induction and progression of cancer. The techniques employed to identify cancer-causing genes, including cancer genomics.

7. DNA STRUCTURE/DAMAGE (2 lectures – VM)
   i) DNA structure and properties of DNA
   ii) Anti-tumour drugs that affect cell division
   iii) Methods to assess drug-DNA damage
   iv) DNA sequencing techniques to analyse drug-DNA damage
   v) Next-generation DNA sequencing techniques to analyse drug-DNA damage

8. VIRAL VECTORS/THERAPY (1 lecture – NW)
Inverted lecture in which groups discuss recent examples of gene therapy and the viral vectors used. The groups will then report out to the whole class.

10. Catalytic Nucleic Acids (1 lecture. AT)
    TBA
9. FUTURE DIRECTIONS IN NUCLEIC ACIDS AND MOLECULAR TECHNIQUES (1 lecture MJ)
    Frontiers and molecular biology – research projects
    Other courses relevant to molecular biology