SECTION A – TEACHING, LEARNING AND ASSESSMENT

COURSE AIMS
The purpose of this course is to provide theoretical and practical knowledge in clinical molecular microbiology.

LEARNING OUTCOMES
This course will cover the basic concepts of modern molecular biology techniques applied to the identification and epidemiology of micro-organisms and biotechnology. These are modern trend techniques which are continuously being developed for the monitoring of transmissible diseases, epidemiological studies of food-borne and zoonotic diseases, tracking and tracing of genetically modified organisms and biological warfare weapons.

CONTENT, ORGANISATION AND TEACHING STRATEGIES
The content emphasis and reflects the practical and vocational nature of the course for practising microbiologists and biotechnologists. The content strongly focuses on the new directions in molecular biology and its application to modern molecular microbiology and biotechnology-based laboratories. The course introduces various sophisticated automated equipment that are commonly used in microbial diagnostics and biotechnology.

Contact Summary
This course will be taught by formal lectures of three hours per week over 13 weeks. Formal lectures are an efficient method for delivery of resource material which provides immediate opportunity for discussion with the presenter in a small class format. It is also a usual and important method for ongoing education within all professions.

A list of recent trend assignment topics will be given out to students in week 1. Students will be assessed on a presentation of a seminar on the same topic in weeks 12 to 14.

CONTENT SUMMARY
A summary of lecture content is listed below

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Presenter</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>1 Mar 8 Mar</td>
<td>Water Microbiology – The environment, microbiology standards &amp; established cultural methods</td>
<td>BP</td>
<td>Nathan Campus N6_0.25</td>
</tr>
<tr>
<td>3</td>
<td>16/03/11</td>
<td>Introduction to PCR, real-time PCR and Quantitative PCR</td>
<td>DW</td>
<td>Conference Room Floor 7 SASVRC, RCH</td>
</tr>
<tr>
<td>4</td>
<td>23/03/11</td>
<td>PCR applications, limitations, assay design.</td>
<td>DW</td>
<td>Conference Room Floor 7 SASVRC, RCH</td>
</tr>
<tr>
<td>5</td>
<td>30/03/11</td>
<td>Molecular typing methods. SNP analysis, HRM</td>
<td>DW &amp; SB</td>
<td>Conference Room Floor 7, SASVRC, RCH</td>
</tr>
<tr>
<td>6</td>
<td>06/04/11</td>
<td>Molecular Epidemiology of Bacteria</td>
<td>TK</td>
<td>Conference Room Floor 7 SASVRC, RCH</td>
</tr>
<tr>
<td>7</td>
<td>13/04/11</td>
<td>Practical Class</td>
<td>DW &amp; RS</td>
<td>Laboratory, Floor 7, SASVRC, RCH</td>
</tr>
<tr>
<td>8</td>
<td>20/04/11</td>
<td>Practical Class</td>
<td>DW &amp; RS</td>
<td>Laboratory, Floor 7, SASVRC, RCH</td>
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22 April – 2 May Mid-semester Break
Lecture timetable and venue:
Note that the timetable and venue supersedes the time table posted on the GU@Learning website. This change is so that students get maximum exposure and experience in a work environment where they are able to conduct experiments. The revised timetable and venue:

**Weeks 1 & 2 on Tuesdays**
Nathan Campus from 2 to 5 pm in N06 (Pat Thoms) 0.25

**Weeks 3 to 13 on Wednesdays**:
Sir Albert Sakzewski Virus Research Centre from 1.00 pm to 4.00 pm in the seminar room, Level 7, (refer to attached map).

**Lecturers:**
BP = Professor Bharat Patel
TS = Professor Theo Sloots
DW = Dr David Whiley
SB = Dr Seweryn Bialasiewicz
TK = Dr Tim Kidd
CB = Dr Cheryl Bletchly

**Lecture summaries:**
Lecture summaries (and these are summaries only and not the full notes) will be provided during the lecture periods and / or posted at the URL
(a) http://trishul.sci.gu.edu.aupg_courses/7221BPS_AMM/
(b) http://www.sasvrc.qld.gov.au/GriffithLectures.html

**Assignment Topics:**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Assignment Topics for Molecular Biology &amp; Bioinformatics Students</th>
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</thead>
</table>
| 1.    | Nucleic acid amplification techniques have made a significant impact on microbial diagnostics and have challenged traditional laboratory methods. Review the use of nucleic amplification techniques in microbial diagnostics, addressing the following:  
Types of methods  
Advantages and disadvantages  
General application to diagnostics  
Specific example in diagnosing disease  
Other applications  
Future directions |
| 2.    | Herpes simplex encephalitis is a serious and potentially fatal disease in humans. A favourable prognosis is dependent on early detection and appropriate anti-viral therapy. The traditional methods of diagnosing this disease are based on performing brain biopsy, which is insensitive, non-specific and traumatic to the patient.  
Describe how you would develop a molecular method for the diagnosis of HSV encephalitis, showing details of each step involved, the advantages and disadvantages of this method over traditional methods, and the way this test might be introduced into the laboratory to diagnose the disease. |
| 3.    | A novel mosquito-borne RNA virus has been identified as one of the causative agents of schizophrenia. It has been named Griffith virus following its first isolation from students attending the Griffith University campus. Your task is to establish a suitable PCR diagnostic assay to detect infection by this agent. Describe in detail each step used in the development of such an assay including:  
Primer identification and design |
Optimisation of the PCR method
Steps included in the diagnostic test (eg extraction, amplification parameters, detection)
Interpretation of results
Quality control

4. Choose ONE of the following bacteria:
   Neisseria meningitidis
   Staphylococcus aureus (MRSA)
   Escherichia coli O157

Review the use of molecular epidemiological typing methods for the organism and address the following:
   Types of methods used
   Advantages and disadvantages
   Limitations (if any) as regards the laboratory and/or the patient
   Other methods that might be used (give reasons for your choice)

5. Recombinant technology in the production of bioterrorism weapons

6. Cloning strategies for recombinant protein over expression (includes gene synthesis technology)

7. Strategies for the purification of recombinant proteins

8. Strategies for the sequencing of bacterial genomes using NextGen sequencers

9. Next generation biofuel production with microbial systems

ASSESSMENT

Summary of Assessment

<table>
<thead>
<tr>
<th>Item</th>
<th>Assessment Task</th>
<th>Length</th>
<th>Weighting</th>
<th>Total Marks</th>
<th>Relevant Learning Outcomes</th>
<th>Due Day and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Laboratory assessment</td>
<td>Lab book, Attendance</td>
<td>20% 5%</td>
<td>100 100</td>
<td>5-7</td>
<td>Weeks 8 &amp; 9</td>
</tr>
<tr>
<td>2</td>
<td>Seminar</td>
<td>10 mins</td>
<td>25%</td>
<td>100</td>
<td>2 -11</td>
<td>Weeks 12-14</td>
</tr>
<tr>
<td>3</td>
<td>End of semester examination</td>
<td>90 min</td>
<td>50%</td>
<td>100</td>
<td>1, 4 - 7</td>
<td>Central exam period</td>
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Assessment Details:
Laboratory: A written record of all activities undertaken as part of the laboratory classes will be assessed. The record book should contain details of the activity such as introduction, methods, results and discussion and any other information that may be important in the interpretation of the results.

Seminar: The marking criteria for the 10 minute oral seminar presentation on the assignment topic are as follows. Note that assessment will be on the student’s ability to present scientific material in an analytical and logical manner NOT on their ability for public speaking:
   Introduction of the material
   Presentation of the relevant issues
   Summary and conclusion
   Use of tables, figures and references

End-of-semester Exam: A multiple choice examination of 90 minutes duration will be held during the normal University exam period.

GRADUATE SKILLS

The following graduate skills will be developed as part of this course
Graduate Skills | Taught | Practised | Assessed |
--- | --- | --- | --- |
Effective communication (written) | X | X | |
Effective communication (oral) |  | X | |
Effective communication (interpersonal) |  |  | X |
Information literacy | X | X | |
Problem solving | X | X | |
Critical evaluation | X | X | |
Work autonomously | X | X | |
Work in teams |  |  |  |
Creativity and innovation |  |  | X |
Ethical behaviour in social / professional / work environments |  |  | X |
Responsible, effective citizenship |  |  | X |

**TEACHING TEAM**

**Course Convenor**

<table>
<thead>
<tr>
<th>Convenor Details</th>
<th>Nathan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Convenor</td>
<td>Professor Bharat Patel</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:b.patel@griffith.edu.au">b.patel@griffith.edu.au</a></td>
</tr>
<tr>
<td>Office Location</td>
<td>N34 2.36</td>
</tr>
<tr>
<td>Phone</td>
<td>3735 7695</td>
</tr>
<tr>
<td>Fax</td>
<td>3735 7800</td>
</tr>
<tr>
<td>Consultation times</td>
<td>Please make contact via email, phone or at lecture to arrange an individual consultation if required.</td>
</tr>
</tbody>
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*Additional teaching team members*

Dr Theo Sloots, QPID, SASVRC, Royal Children's Hospital, Herston Road, Herston, Queensland 4029, Australia. Phone: 61 7 3636 8833. Fax: 61 7 3636 1401. Email t.sloots@uq.edu.au

**COURSE COMMUNICATIONS**

Please contact teaching team members via email, phone or at the time of the lecture so that a suitable individual appointment can be made. Please remember to check the learning at Griffith web site for this course for announcements and information; also regularly check your student email.

**TEXTS AND SUPPORTING MATERIALS**

It is expected that students will take notes during lectures. Resources of the library and electronic databases are the best source of additional information. There are no prescribed textbooks. Additional source material will be discussed in lectures and posted to the learning at Griffith site or to an alternate web site appropriate to this course, during semester.
Students should refer to the Learning@Griffith website for further information about this course.