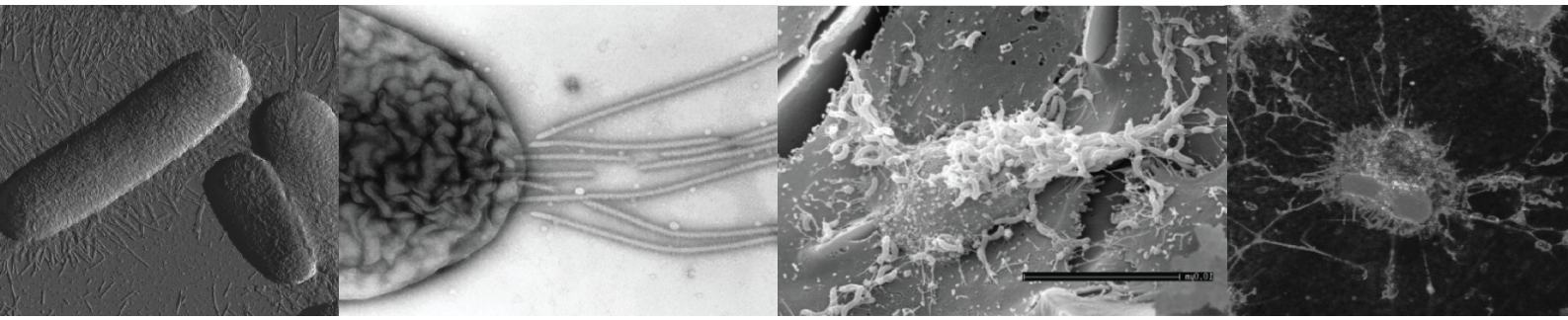
UMEÅ UNIVERSITY
Department of Molecular Biology
Sun Nyunt Wai

SCHEDULE
5MO097 Bacterial Physiology and Pathogenesis, HT20
2020-07-03 (Preliminary)



BACTERIAL PHYSIOLOGY & PATHOGENESIS, 7.5 ECTS

COURSE TIME: 30th September, 2020 –1st November, 2020

LOCATION:

Lectures: Online via Zoom (links to be provided)
On-site at **Astrid Fagraeus, room A103**, Building A in the Norrlands University Hospital (NUS) area

Practical (wet-lab): **"Green" and "Red" laboratories",**
floor 1, Building 6L in the Department of Molecular Biology

Practical (dry-lab): Home studies, and
On-site computer laboratory, **room Thymine / Uracil (6K-148),** Building 6K in the Department of Molecular Biology

LITERATURE: For example:

1. Online resource: Todar's Online textbook of Bacteriology at *http://www.textbookofbacteriology.net/index.html*
2. Online resource: Microbiology and Immunology Online at *http://pathmicro.med.sc.edu/book/bact-sta.html*
3. Online resource: N. Parker, M. Schneegurt, A.T Tu, B. M. Forster, P. Lister (2016) "Microbiology" Online at *https://openstax.org/details/books/microbiology*
4. Other material provided by the Department.

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EXAMINATION: Monday, November 5th, 9.00-13.00, Lecture hall N320, Naturvetarhuset

RE-EXAMINATION: Monday, December 10th, 16.00-20.00, Östra Paviljongen

COURSE LEADER: Sun Nyunt WAI
Phone: 785 6704; Email: *sun.nyunt.wai@umu.se*

ADMINISTRATOR: Ingela NILSSON
Phone: 785 2869; Email: *ingela.nilsson@umu.se*

LABORATORY ASSISTANTS: Jyoti Gurung **(JGu)**
Email: *jyoti.mohan.gurung@umu.se*
[??????????*@analys.urkund.se* (Lab examination II only)]

Eric Toh (ETo)
Email: *erik.toh@umu.se*

LABORATORY SESSIONS: (Strictly Mandatory – performed individual)
"Genetic and physiological characterization of enriched bacterial isolates" (**JGu, ET**)

LABORATORY EXAMINATION: (Strictly Mandatory – individual assessment)

- Oral presentation – 5 mins – highlighting the major objectives and achievements of the laboratory module, followed by a *viva voce* exam – 5 mins – where you will give a verbal defence of your oral presentation. (**Lab examination I**)
- Submission of **non-plagiarized** written answers to a laboratory quiz. (**Lab examination II**)
  Answers are to be submitted electronically to the Laboratory assistants' (**JGu, ET**) "**Urkund**" email addresses.
- In addition, your own personal laboratory notebook **MUST** be utilized on every single laboratory session. It is also your responsibility to have this **CERTIFIED** (signed and dated) by a lab assistant (**JGu, ET**) at the conclusion of **EVERY** laboratory session. You could think of this exercise as **examination III**.

Note: You **must** obtain a grade 'G' to gain credit for this laboratory module.

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LECTURERS

Victoria SHINGLER **(VSh)** *victoria.shingler@umu.se*
Jörgen JOHANSSON **(JJo)**: *jorgen.johansson@umu.se*
Matthew FRANCIS **(MFr)** *matthew.francis@umu.se*
Sun Nyunt WAI **(SNW)** *sun.nyunt.wai@umu.se*

LECTURER THEMES

Principles and Applications of Bacterial Diversity

- Bacterial Diversity (Lecture 1; SNW)
- Extreme Environments (Lecture 2; SNW)
- Bioenergetics (Lecture 3; MFr)

General Principles of Bacterial Regulatory Networks

- Transcriptional Regulation (Lecture 4; VSh)
- Signal Transduction by Two-Component Regulatory Systems (Lecture 5; VSh)
- Post-transcriptional Regulation (Lecture 6; JJo)
- Translational Regulation (Lecture 7; JJo)
- Post-translational Regulation (Lecture 8; SNW)

Important Physiological Processes

- Bacterial Stress Responses – Global Regulation (Lecture 9; VSh)
- Solute Transport (Lecture 10; MFr)
- Protein Secretion Systems (Lecture 11; MFr)
- Bacterial Motion (Lecture 12; VSh)
- Prokaryotic Differentiation and Development (Lecture 13; SNW)

Bacterial Virulence Strategies

- Bacterial Pathogenesis I – pathogen evolution and the study of bacterial pathogens (Lecture 14; MFr)
- Bacterial Pathogenesis II– the infection process and virulence mechanisms (Lecture 15; SNW)
- Bacterial Pathogenesis III – bacterial responses to the host cell (regulating virulence) (Lecture 16; SNW)
- Bacterial Pathogenesis IV – treatment and prevention (Lecture 17; SNW)

TUTORIALS

Two tutorial sessions have been planned.

This time is allocated for **YOU** to address **YOUR** questions to the course leader and/or other participating lecturers. Make full use of this available time by ensuring your advanced preparation (i.e.: go through the lecture material before the tutorial).

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Remember that:

a) Social distancing practices are enforced during on-campus studies

b) Stay at home if you exhibit any illness symptoms, even if minor! If the department via the student departmental hotline.

c) Students work individually

*d) Students must attend, either in real life or online, all laboratory orientation/introductory sessions and the full duration of **every** experimental session*

*e) Any absence, even for a short period, must be first reported to, and/or agreed upon by the Course assistant in charge (i.e. if healthy, you **cannot** come and go when you please)*

f) Laboratory notebooks are to be certified by a lab assistant at the conclusion of each session

Please use any "free" time wisely!

Important Information:

i. Lab equipment is very expensive – use with extreme care and concentration. If you are unsure, ask how to use a particular piece of lab equipment properly.

ii. In the labs, you will be potentially working with pathogenic bacteria deserving of your respect. Follow all advice given to you about safety precautions.

iii. Treat your lab assistants with respect; it is not an easy job and they do have more laboratory experience than you do.

iv. To be allowed to sit the exam, all laboratory examinations must be completed and/or submitted.

During a fire alarm, evacuate promptly to the clearing, a safe distance from the outside entrance to building 6L.

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Week 40 (working week 1)

Wednesday (30-09-2020)

09.00 – 09.45	**Course orientation & Roll-call** (SNW)	Online via Zoom
10.00 – 12.00	Lecture 1: **"Bacterial Diversity"** (SNW)	Online via Zoom
Lunch		
13.00 – 14.00	Lecture 2: **"Extreme Environments"** (SNW)	Online via Zoom

Thursday (01-10-2020)

09.00 – 09.45	**Laboratory Safety** (SNW; JGu; ETo)	Online via Zoom
10.00 – 11.00	Introduction to the **laboratory course** Information concerning **laboratory examination I (oral) examination II (written quiz) & examination III (notebook)** (SNW; JGu; ETo)	Online via Zoom
Lunch		
12.00 – 18.00	Laboration: **"Exercise 1 – Dry lab"** (JGu; ETo) Computational sequence data analysis (bacterial identity/*clustal W* analysis)	Computer suite (Thymine / Uracil)

Group 1: 12.00 – 13.50	**Group 2:** 14.00 – 15.50	**Group 3:** 16.00 – 17.50

Remember to use your **laboratory notebook**!

Friday (02-10-2020)

09.00 – 11.00	Lecture 4: **"Transcriptional Regulation"** (VSh)	Online via Zoom

Study time:
Use it wisely!

NOTE: The endpoint for laboratory session times is our best estimation. The endpoint depends upon numerous variables – not in the least on your performance, and growth rates of bacteria and eukaryotic cells.

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Week 41 (working week 2)

Monday (05-10-2020)

09.30 – 11:00 Lecture 5: **"Signal Transduction by Two-Component Regulatory Systems"** (VSh) Online via Zoom

12:00-113:30 Lecture 12: **"Bacterial Motion"** (VSh) Online via Zoom

Tuesday (06-10-2020)

09.00 – 11.00 Laboration: **"Exercise 2 – Dry lab"** Astrid Fagraeus (A103)
(MFr; JGu; ETo)

In vitro bacterial infection model – HeLa cell association and uptake assay
Understanding of experimental context and raw data analysis

Group 1: 09.00 – 10.00	**Group 2:** 10.00 – 11.00

Study time:
Use it wisely!

Wednesday (07-10-2020)

09.00 – 11.00 Lecture 6: **"Post-transcriptional Regulation"** (JJo) Online via Zoom

Lunch

12.00 – 14.00 Lecture 7: **"Translational Regulation"** (JJo) Online via Zoom

Thursday (08-10-2018)

09.00 – 11.00 Lecture 8: **"Post-Translational Regulation"** (SNW) Online via Zoom

Study time:
Use it wisely!

Friday (09-10-2020)

9:00-11:00 Lecture 9: **"Bacterial Stress – Global Regulation"** (VSh) Online via Zoom

Lunch

13.30 – 16.30 Lecture 3: **"Bioenergetics"** (MFr) Online via Zoom

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Week 42 (working week 3)

Monday (12-10-2020)

09.00 – 11.30 Lecture 10: **"Solute Transport"** (MFr) Online via Zoom

Study time:
1) Literature study of sequenced bacteria; preparation for experimental plan discussions
2) Preparation of study questions for Friday's first theory Q&A tutorial

Tuesday (13-10-2020)

09.00 – 11.30 Lecture 11: **"Protein secretion systems"** (MFr) Online via Zoom

Study time:
Use it wisely!

Wednesday (14-10-2020)

09.00 – 11.00 Lecture 13: **"Prokaryotic Differentiation and Development"** Online via Zoom (SNW)

Lunch

13.30 – 16.30 Lecture 14: **"Bacterial Pathogenesis I"** (MFr) Online via Zoom

Thursday (15-10-2020)

09.00 – 12.00 Lecture 15: **"Bacterial Pathogenesis II"** (SNW) Online via Zoom

Study time:
1) Literature study of sequenced bacteria; preparation for experimental plan discussions
2) Preparation of study questions for tomorrow's first theory Q&A tutorial

Friday (16-10-2018)

09.00 – 12.00 Lecture 16: **"Bacterial Pathogenesis III"** (SNW) Online via Zoom

Lunch

14.00 – 15.30 Q&A session: **"Tutorial I"** (SNW) Astrid Fagraeus (A103)

Study time:
Remember to have a prepared literature study of you sequenced bacteria; be preparation for experimental plan discussions

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Week 43 (working week 4)

Monday (19-10-2020)

09.00 – 09.45	Laboration tutorial I: **“Exercise 2 – Dry lab”** (MFr; JGu; ETo) Q&A session to ensure progress through this Dry-lab exercise!	Online via Zoom
10.00 – 12.30	Lecture 17: **“Treatment and Prevention”** (SNW)	Online via Zoom

Lunch

13.30 – 15.30	Laboration tutorial II: **“Day 1 – Wet lab”** (JGu; ETo) Bacterial strain selection **Wet-lab** discussions of experimental protocols and workflow **Discussion** of laboratory etiquette (vital during Covid19 times)	Online via Zoom

Tuesday (20-10-2020)

08.30 – 12.30	Laboration: **“Group 1, Day 2” Wet lab** (JGu; ETo)	Laboratory (Red and Green)

Lunch

13.30 – 17.30	Laboration: **“Group 2, Day 2” Wet lab** (JGu; ETo)	Laboratory (Red and Green)

Wednesday (21-10-2020)

08.30 – 12.30	Laboration: **“Group 1, Day 3” Wet lab** (JGu; ETo)	Laboratory (Red and Green)

Lunch

13.30 – 17.30	Laboration: **“Group 2, Day 3” Wet lab** (JGu; ETo)	Laboratory (Red and Green)

Thursday (22-10-2020)

Study time:
Preparation for Lab examinations I, II and III

Friday (23-10-2020)

09.00 – 10.30	Laboration **"round-up"** (JGu; ETo)	Online via Zoom

Study time:
1) Preparation for Lab examinations I, II and III
2) Preparation of study questions for Wednesday's second and final theory Q&A tutorial

Week 44 (working week 5)

Monday (26-10-2020)

08.30 – 12.30 Laboration examination – Part 1 (Note: Individual schedule will follow)

Group 1 (room Uracil) SNW & JGu	**Group 2 (**room Thymine) MFr & ETo

Lab examination I "Individual oral presentations (5 mins) followed by a *viva voce* exam – 5 mins)"
Lab examination III "Present your laboratory notebook to SNW (group 1) or MFr (group 2)"

Mandatory

Closed individual examination – Not open to an audience

Study time:
Preparation of study questions for Wednesday's second and final theory Q&A tutorial

Tuesday (27-10-2020)

Private study

Wednesday (28-10-2020)

9.30 – 11.30 Q&A session: **"Tutorial II"** (SNW) Astrid Fagraeus (A103)

Private study

Thursday (29-10-2020)

Private study

Friday (30-10-2020) **"Theory Examination"**

9:00-13:00 Location: Östra Paviljongen ÖP

24.00 Lab examination – part 2 – deadline for **Lab examination II**
"Written quiz responses"
(Examiners: JGu; ETo)
Submit electronically to:
???????.umu@analys.urkund.se

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Week 51

Monday (14-12-2020)

9:00-13:00	**“Re-Examination”** **Location: Östra Paviljongen ÖP**

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Summary of course composition

Week 41	Week 42	Week 43	Week 44	Week 45	Week 51
Lectures					
	Tutorial (I)			**Tutorial (II)**	
Dry-lab exercises (individual work assignment) ***mandatory***					
			Wet-lab exercises (individual work assignment) ***mandatory***		
			Laboratory 'Round-up'		
				Laboratory Examination I ***mandatory***	
				Laboratory Examination II ***mandatory***	
				Theory exam	**Theory Re-**

				(4h)	**exam (4h)**