Biomedical Informatics 3

Zhejiang University – University of Edinburgh Institute

Course Handbook
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DISCLAIMER

Every effort has been made to ensure that the information contained in this document is correct at the time of going to press. However, it will not form part of any contract between the Institute and a student and must be read in conjunction with the Terms and Conditions as set out in the International Campus Detailed Regulations, the ZJE Institute Supplementary Regulations and the ZJE Institute Taught Assessment Regulations. The contents of this handbook apply to the session year stipulated. The Institute may make changes to the course for future sessions.

If you require this document or any of the ZJE online resources mentioned in this document in an alternative format please contact the ZJE Administration Office [zjeteaching@intl.zju.edu.cn, 87572810]

Biomedical Informatics 3

Contents

1. GENERAL INFORMATION

1.1 Overview of Course

Biomedical Informatics 3 provides students the opportunity to develop their skills and understanding of algorithms in biomedical informatics. The course will provide a solid theoretical foundation on various algorithms, with an emphasis how to design algorithms for biomedical problems, and how these algorithms can be applied to biomedical problems. To facilitate the students' skills for the application of algorithms for biomedical data analysis and to improve their problem-solving skills, the course also introduces sessions for advancing communication with biomedical scientists and software engineers.

BMI3 is worth 20 UoE credits/5 ZJU credits and runs in semester 1.

1.2 Course Learning Outcomes

After taking this course, students will be able to:

- Describe and discuss the main principles of algorithms, and how they can be used to solve biomedical problems.
- Characterize and render biomedical problems into bioinformatics problems
- Develop, implement, and apply bioinformatics algorithm knowledge to solve an omics problem in a group setting.

1.3 Course Handbook

This course handbook gives you contact information and contains an outline of the course structure and content, and the summative assessments. More details can be found on the Biomedical Informatics 3 Blackboard Learn page. General information about your courses and programme can be found in the Programme Handbook. You should read this Course Handbook in conjunction with this guide.

1.4 Feedback

Giving, receiving, understanding, and acting on feedback is critical in developing your knowledge and skills. The aim of feedback is to give you an indication of how your work compares to the desired standard. Most commonly, this is indicated by a mark, but written or verbal feedback, specific to you as a learner and the specific piece of work, will also be given.

In this course, we aim to make our feedback useful, timely, consistent, and concrete – we will describe what you did well and what you need to improve to achieve a better outcome. For each piece of formally assessed work you will receive your mark and feedback within 15 working days of submission.

Certain components of the course (the ICAs, for example) will be followed by very clear instances of academic feedback. But remember that feedback is not limited to this. In BMI3 there will be many types of formal and informal feedback, and feedback can come from your classmates too. Formative feedback will be provided as key academic skills are developed particularly in essay

writing and presentational skills. An important skill is to recognise *when* you are being given feedback. **Throughout the course, think about and use all the feedback you are given to improve your work!**

1.5 Formative Assessment

In addition to assignments that contribute to your final mark (summative assessments), the course features formative assessment. Formative assessment does not contribute to your final mark.

Formative assessment provides ongoing feedback that you can use to improve your learning, and helps instructors to improve the teaching. It helps both students and teachers identify concepts that are difficult to understand, and skills that are difficult to acquire.

1.6 Student Support

If you encounter any difficulties with, or have questions about, a specific aspect of the course, in the first instance you should discuss this with the member of staff responsible for delivering that material. You can find their name on the detailed schedule on the BMI3 Blackboard Learn page. The Course Administrator can provide you with their contact details if required.

If you have questions or concerns about the course more generally, or a question about an assignment or feedback you have received, please contact the Course Administrator or the Course Organiser – their contact details are in this handbook.

You can also talk to your Academic Advisor about any issues you experience. Please see the Programme Handbook for more information on expectations about the Academic Advisor-Advisee relationship.

Further information and sources of support can be found in section 8 of this handbook.

1.7 Special Circumstances

Special Circumstances are defined as events that are beyond the control of the student and which have the potential to adversely impact on academic performance. The ZJE Special Circumstances Policy provides a mechanism for students to notify the ZJE Institute about any special circumstances affecting their performance during the academic year, for the ZJE Institute to assess the impact of any special circumstances and act accordingly.

Full information on the ZJE Special Circumstances Policy and procedures can be found in the Programme Handbook.

If you are experiencing any circumstances that are having a negative effect on your work or your engagement with the course, we strongly encourage you to contact your Academic Advisor as soon as possible.

1.8 Hybrid teaching

This year, due to the COVID-19 pandemic, part of our teaching staffs and students might not be able to return to the Haining Campus for this course. If they still cannot return to the campus by when the course is delivered, we would adopt the online & face-to-face 'hybrid teaching strategy' as stated below.

- Teaching staff cannot return to campus
    - Lecture slides will be pre-recorded and be livestreamed to students in classroom.
    - Practical sessions will be delivered live through webex or facilitated by other teaching staff on campus.
- Students cannot return to campus:
    - Lecture/practical sessions would be livestreamed and recorded in classroom.

2. COURSE COMMUNICATION

2.1 Course Team

Course Organisers	Wanlu Liu (WL)	wanluliu@intl.zju.edu.cn
Academic staff	Hugo Samano (HS)	hugo.samano@embl.de
	Zhaoyuan Fang (ZF)	zhaoyuanfang@intl.zju.edu.cn
Course Administrator	Yanhui Chen	yanhuichen@intl.zju.edu.cn
Teaching Assistant	Ziwei Xue	xueziwei@zju.edu.cn
	Ruonan Tian	ruonan.21@intl.zju.edu.cn

2.2 Blackboard Learn

The course is supported by Blackboard Learn, a virtual learning environment. Course materials and extra resources are provided there. You will submit some summative assessments via Blackboard Learn. **Please make sure that you regularly check the Blackboard Learn course website.** This is the definitive source of information, course materials and changes to the timetable or assessments. You can access Blackboard Learn here: https://c.zju.edu.cn/

2.3 Student-Staff Liaison Committee

The academic staff welcome your views on how the course can be improved and, when appropriate, we will act on your suggestions. To ensure that the views of all students are represented, Student Representatives ("Student Reps") will be selected soon after the start of the course. Throughout the course, please raise issues with your Student Reps who will pass these to the Course Organisers.

An online student feedback survey will take place at the end of Semester. You can give your anonymous opinions on the course content, level of difficulty, level of interest, suggestions how to improve the course, and any other comments (positive and negative).

Student Reps and selected academic staff make up the Student-Staff Liaison Committee. This committee will meet formally around the middle of the Semester to discuss the feedback surveys and other issues raised by staff and students. Before this meeting, the student reps will carry out an anonymous feedback survey. This will give you the opportunity to highlight what is working well and what you think needs to be improved. You may also discuss course issues at any time by contacting the Course Organisers or the Course Administrator.

2.4 External Examiner

The External Examiner for this course is to be confirmed. You should **not** make direct contact with the External Examiner. Contact the Course Organisers if you have questions on assessments.

3. COURSE STRUCTURE

Teaching sessions are interactive and student-centred wherever possible. These sessions are your opportunity to consolidate and expand your knowledge and understanding of course material, **take advantage of these opportunities!**

This course is integrated. **You are expected to attend every teaching session.** If you are unable to attend, you should email the Course Organiser and Course Administrator giving a reason for your absence.

Algorithms used in biomedical informatics such as exhaustive search, greedy algorithms, graph algorithms, dynamic programming algorithms, randomized algorithms, string algorithm and combinatorial pattern matching, divide-and-conquer algorithms, clustering, hidden markov models, dimensionality reduction, as well as communication and professionalisms will be delivered in lectures and reinforced in practical sessions. In this year, we will also include workshop sessions including introduction to programming in python, data structure, introduction to LaTeX, and introduction to linear algebra.

The academic staff will endeavor to post copies of the relevant learning resources on the BMI3 Blackboard Learn site the week before the teaching session happens. Please look and read carefully this material in advance of the teaching session as you may be required to do some preparation.

3.1 Timetables

You can find timetable information at Peoplesoft.

If there are any changes to your timetable (for example, a change of venue) you will be emailed information about the change, and a notice about the change will also be posted on Learn.

3.2 Teaching activities

Teaching activities are from **9:00 – 11:50 on Tuesday** and **14:00-16:50 on Thursday** every week. Lectures, practical, workshops will be included in those teaching activities. Copies of the lecture slides will be given on Blackboard Learn at least 24 hours before the lecture.

Our lectures, practical, workshop are computer practical sessions. Please bring a laptop. If you do not have a laptop, or if your laptop is broken, please contact the course organizers immediately, so we can make alternative arrangements.

We have also arranged 6 workshop sessions including introduction to python programming, introduction to LaTeX, career development in bioinformatics field etc.. Detailed arrangement will be given on Blackboard learn.

Occasionally, we will use our lectures practical sessions for other activities, for instance project presentations and so on. Please check your e-mails and Blackboard Learn for information on timetables and rooms.

Just like a laboratory practical, you need to document your work done in a computer practical. This is not done by using a physical lab book, but by keeping electronic records. You may want to keep those records on your own computer and keep track of changes using git, or you may choose to have a public portfolio on GitHub. It is up to you. In this course, your portfolio is not assessed. However, you may later find it useful (both during the revision stage of this course, and in later years) to go through your code from this course again. Therefore, make sure that your code is well-organized, well-documented and suitably backed up.

3.3 Programming languages

In this course, most of the programming tasks covered in practical sessions will be completed with Python3 language unless the instructor has other instruction. Please check your e-mails and Blackboard Learn for information.

3.4 Course Timetable

Week	Date and Time	Theme
1	2022/9/13	Intro to algorithm, pseducode, python
	2022/9/15	Intro to algorithm complexity
2	2022/9/20	[Workshop 1] Numpy, Pandas, advanced coding practices in python
	2022/9/22	Intro to Data structure
3	2022/9/27	Exhaustive search
	2022/9/29	Greedy algorithms 1
4	National Holidays	
5	2022/10/11	Greedy algorithms 2
	2022/10/13	[Workshop 2] Communication and professionalism 1; Live stream programming in python; Intro to LaTeX
6	2022/10/18	Graph algorithm 1
	2022/10/20	Graph algorithm 2
7	2022/10/25	Dynamic programming 1
	2022/10/27	Dynamic programming 2
8	2022/11/1	[Workshop 3] How to debug
	2022/11/3	String algorithm and combinatorial pattern matching 1
9	2022/11/8	String algorithm and combinatorial pattern matching 2
	2022/11/10	String algorithm and combinatorial pattern matching 3
	2022/11/14	Submission deadline for ICA proposal

	12:00 (noon)	
	2022/11/18 12:00 (noon)	Feedback for ICA proposal to students
10	2022/11/15	Divide-and-Conquer Algorithms 1
	2022/11/17	Divide-and-Conquer Algorithms 2
11	2022/11/22	[Workshop 4] Communication and professionalism 2: Towards the next step in your bioinformatics career
	2022/11/24	Randomized algorithms
12	2022/11/29	Clustering
	2022/12/1	Dimensionality reduction - PCA
13	2022/12/6	Dimensionality reduction - t-SNE, UMAP
	2022/12/8	Hidden Markov Models
14	2022/12/13	[Workshop 5] Communication and professionalism 3: research seminar and career sharing by bioinformatics researcher in Tencent AI Lab
	2022/12/15	Mini-project final presentation
	2022/12/16 12:00 (noon)	Submission deadline for ICA code and documentation
15	2022/12/20	[Workshop6] Review Sessions & mock exam

4. TEXTBOOKS

In addition to attending and engaging in teaching sessions, you must read independently. Academic staff may include specific recommended reading in their teaching sessions, but the books listed below are recommended for this course.

Jones N C, Pevzner P A, Pevzner P. An introduction to bioinformatics algorithms[M]. MIT press, 2004.

Compeau P, Pevzner P. Bioinformatics algorithms: an active learning approach[M]. La Jolla, California: Active Learning Publishers, 2015.

5. ASSESSMENT AND EXAMINATION INFORMATION

This course is assessed by in-course assessment (ICA) only.

In order to pass the BMI3 course, you must:

1. Submit all assessments that contribute to the ICA component of the course, AND

2. obtain an overall ICA mark of at least 60% in the ICAs, AND

3. obtain a final mark of at least 60% in the computer-based timed coding challenges.

5.1 In-Course Assessment

The ICAs consist of:

1. A 'mini-project' involving choosing and solving a more elaborate problem (group-based projects, assessed based on a reflective written report (individual mark) 20%, source code (group mark) 10%, and oral presentation 20%(group mark)).

Further details are given in Section 6.

5.2 Degree Examinations

There will be an open-book, computer-based timed exam during the final week, solving simple real-life problems, including writing simple algorithms (individual, 50%).

5.3 Resit Information: Failure to meet the pass criteria.

The full details regarding resits, progression and degree award are provided in Part D of the Program Handbook.

1. For the UoE degree, there are **no resits in Year 3 or Year 4**. The only exception is when a Special Circumstances application is upheld for the failed assessment. In such cases, the ZJE Board of Examiners may grant a null sit for the failed assessment and allow the student to resit the assessment on a first-sit basis.
2. For the ZJU degree, resits are permitted for all assessments **when opportunities to do so are available**, but all required credits must be acquired within six years.

Please refer to the Program Handbook for further details.

5.4 Common Marking Scheme

Assessment will be graded according to the ZJE Common Marking Scheme. This is given in the Programme Handbook. Detailed written guidance and the marking criteria for each ICA will be posted in advance on Blackboard Learn. For guidance on the marking scheme, see the Programme Handbook.

6. COURSE ASSESSMENTS

The ICA for BMI3 as outlined below.

You must achieve an overall mark of 60% or greater in your ICA in order to pass the ICA component of the course. All ICAs will be submitted and marked anonymously.

Deadlines for ICA submission, and the dates you can expect to receive marks and feedback on your submissions, are given below and will be posted on Blackboard Learn. All marks released according to this schedule will be provisional and could be subject to change when reviewed and ratified by the Board of Examiners at the end of the academic year.

Information on word limits, referencing, plagiarism and academic misconduct, how to submit your assessments, extensions, and penalties for work submitted late, is also given below.

6.1 Computer-based timed final exam:

You will receive and individual mark for this assignment that is worth 50% of your final mark. This assessment will happen under exam conditions during the semester 1 exam period.

- This assessment is open-book, which means that you are allowed to bring and consult any notes you may have. However, you will not be allowed to access the internet and you will not be allowed to work with other students. Detailed instructions will be distributed prior to the assessment.
- You will receive your provisional marks and feedback for this ICA within 15 working days.
- This ICA will be assessed anonymously by two independent markers and an average mark of their marks used.

6.2 Course project ICA:

Four to five students will form a group to work on a course project related to biomedical informatics algorithms project. You will receive a group mark for this assessment that is worth 30% , and 20% of individual mark of your final mark including 20% from a reflective written report (individual mark), 10% from the source code of your project (group mark), and 20% from group oral presentation (group mark).

- The deadline for this ICA is at **12:00 p.m. (noon) on Friday, 16 Dec 2022**.
- You will receive your provisional marks and feedback for this ICA on or before **Friday, 6 Jan 2023.**
- This ICA will be assessed anonymously by two independent markers and an average mark of their marks used.

6.3 Summary Table of ICA submission and feedback deadlines:

ICA	Submission Deadline	Feedback Deadline
Computer-based timed exam	Semester 1 exam period	Within 15 days
Group mini-project	16 Dec 2022	6 Jan 2023

You will receive written feedback and a **provisional** mark for each of your ICAs on or before the deadlines given above. Your final mark for the course will be made available after the Board of Examiners has ratified all examination and ICA marks. The Board of Examiners meeting takes place soon after the end of Semester 1.

6.4 Submission of ICAs to Blackboard Learn

You will submit your ICAs on Blackboard Learn, unless otherwise instructed. Electronic submission gives you greater flexibility on when you submit your work and accurately tracks your submissions.

All ICA submissions must be made according to the following standard procedure:

- All ICAs (where practical) are marked anonymously. Do not include your name anywhere on your submission.

- Your file title and submission title should include your 4 digit roll number and the title of the assessment (e.g.: 5011_Essay). The Course Administrator will send you your roll number before the first assessment deadline.
- Include your 4 digit roll number and the assessment name on the first page of your assessment document.

Read the assessment guidance carefully for information about file formats and other submission requirements.

You must complete all summative ICAs by the deadline given in the course handbook. If you fail to hand in your work by the given deadlines, penalties may be imposed. If you have problems submitting using Blackboard Learn, please contact the Course Administrator as soon as possible. **It is your responsibility to ensure that you have successfully submitted your assessment to Learn before the deadline**. Information on extensions and penalties for late submission can be found below.

6.5 Late Penalties

If ICAs are submitted after the deadline, they will be recorded as late and a penalty will be deducted from the mark unless there has been an approved extension to the deadline (see 6.6 below) or special circumstances apply (see 1.7 above).

The penalty will be a reduction of the mark by 5% of the maximum obtainable mark per calendar day (for example, a mark of 65% on the ZJU marking scale would be reduced to 60% if submission exceeded the deadline by up to 24 hours). The penalty will increase incrementally by 5% of the maximum mark each day for up to seven calendar days (or to the time when feedback is given, if this is sooner), after which a mark of zero will be given. The original unreduced mark will be recorded and the student informed of it. After the Board of Examiners meeting penalties will be applied and the final ratified mark recorded on the student record system.

If you submit an assessment over seven days after the deadline, or after provisional marks and feedback have been returned, the work will be marked but no mark released to the student and no feedback will be given to the student. You must consult with your Academic Advisor in these circumstances on the appropriateness of submitting Special Circumstances documentation. The Board of Examiners will make a decision on whether to ratify this mark in light of any instruction from the Special Circumstances Committee.

6.6 Extension Requests

If you are unable to submit your ICA by the deadline because of circumstances beyond your control, you can submit a request for an extension of up to seven days (including weekends). The request must be made using the ZJE Extension Request Form before the submission deadline. Extension requests must be formally approved in order for an extension to be granted.

If you require an extension of more than seven days, you will need to apply through the Special Circumstances Policy and Procedure. Please see section 1.7 above, and the Programme Handbook.

Further information on the process for requesting and approving extensions can be found in the Programme Handbook.

6.7 Using references

In your ICAs your writing will build on the work of other researchers and teachers. You acknowledge this by using references. You must use references to give credit to the original worker when you write about ideas, concepts or data that are not your own. Referencing lets your reader distinguish *your* ideas from *other people's* ideas, and lets your reader follow up on ideas that interest them by directing them to the original author. Failing to use appropriate referencing is a form of plagiarism (see below).

We will use the Harvard system of referencing in this course. See the Programme Handbook for a guide to using this system. A correctly and consistently formatted reference list must appear at the end of any ICA where you have referenced other people's work.

You may wish to use references from non-English language sources. If you do cite references in languages other than English, your markers need to be able to review their content. Therefore, if you reference a non-English language source, a full English translation must be supplied as an appendix to your ICA. This appendix does not count to the page limit.

If you use other people's code (from websites, blogs, or open-source platforms like git-hub), you should also properly cite those source.

6.8 Plagiarism and Academic Misconduct

Electronic submission also allows us to automatically check your work for plagiarism. When you submit work electronically to Learn, you will be asked to confirm that you have read and agreed to an 'Own Work Declaration'. Please read this carefully, and make sure that you have met all of the requirements listed on the declaration.

Full information on avoiding plagiarism, and penalties for academic misconduct, can be found in the Programme Handbook.

7. Attendance

There are numerous benefits of attending classes. For example, in-class activities often enhance your critical thinking skills, and face-to-face discussion with your teacher can help clarify your understanding of difficult concepts. Furthermore, classes have a social aspect – you build relationships with your classmates and your teachers. As such, it is important that you attend all your classes. Attendance will be monitored periodically.

Failure to attend classes regularly has serious consequences. Attendance on some courses is checked routinely, on others it is checked periodically. It is your responsibility to register your attendance when necessary. If your attendance is poor, you risk failing the course and failing to complete the programme.

In addition to teaching sessions, you must be available for assessments, examination and meeting Academic Advisors face-to-face or electronically. If you are unable to attend any class or

assessment, you shall ask for leave in advance (you may apply retrospectively for leave in cases of emergency).

8. DIGNITY AND RESPECT

Zhejiang University and the University of Edinburgh have strong and long-standing commitments to equality, diversity and inclusion, and to promoting a positive culture which celebrates difference, challenges prejudice and ensures fairness. ZJE's staff and students are its greatest assets and all members of the ZJE community should expect to be able to excel, and be respected and valued.

Integrity, collegiality and inclusivity are central to our values. In accordance with these values, ZJE is committed to providing an environment in which all members of our community treat each other with dignity and respect, and where bullying, harassment and discrimination are unacceptable. The ZJE Dignity and Respect Policy sets out the expectations placed on all members of ZJE, including students. The policy can be found here:

https://zje.intl.zju.edu.cn/ebm_storage/zje/ueditor/jsp/upload/file/20200704/1593830249285066025.pdf

9. Further Information and Support

The following information can be found in the Programme Handbook or on the ZJE Institute or International Campus website, as follows:

Late submission of work	Programme Handbook
Academic appeals	Programme Handbook
Academic Misconduct	Programme Handbook
Plagiarism	Programme Handbook
Special Circumstances	Programme Handbook

Residential College	http://residential.intl.zju.edu.cn/en
Study Support	http://residential.intl.zju.edu.cn/en/content/academic-life
My ZJU	http://www.intl.zju.edu.cn/en/custom_user/login?destination=myzju
Information Technology Services	http://its.intl.zju.edu.cn/en
Library	http://lib.intl.zju.edu.cn/
Sport and exercise	http://coc.intl.zju.edu.cn/en
Health services	http://coc.intl.zju.edu.cn/en