Maastricht University

Course Manual

The Ventricular Transcriptome in Heart Failure: Analyzing and Presenting Data and Writing a Scientific Manuscript

PRO4002

Academic Year: ***2025 - 2026***

Course Period: ***3***

Faculty of Science and Engineering

Master in Science Programme

Master Biobased Materials and Systems Biology

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Introduction

Course background

PRO4002 is the first opportunity in the MSB program to perform research on a real dataset and implement or refine some of the methods introduced in earlier courses. The data was selected to provide continuity with MSB1005 (it is the same RNA sequencing dataset used in the R assignment in that course). As such, it is strongly recommended that students successfully complete MSB1005 prior to participating in PRO4002.

The project provides an opportunity to expand and develop R skills, integrate data from a broad variety of sources and databases, and implement methods, such as network creation, that were introduced previously.

Gaining practical experience in communicating about a scientific study, both orally and in writing, is a crucial aspect of PRO4002.

General introduction

PRO4002 is a demanding course that seeks to introduce students to the process of conducting and reporting a detailed scientific analysis. A strong emphasis is placed on presenting data and formulating a scientific manuscript.

Heart failure is a major form of cardiac disease that affects many individuals and is, therefore, an important focus of both research and clinical efforts. The disease results from the inability of the heart to pump sufficient quantities of blood, which may be the result of cardiomyopathy, stiffening, myocarditis, congenital deformation, and additional etiological factors. It can be a comorbidity induced by other conditions, including diabetes, hypertension, myocardial infarction, valvular disease, coronary artery disease, sleep apnea, arrhythmias, and viral infections (among others) and may also result from medication side-effects and various lifestyle factors.

As heart failure results from morphological changes to the heart, particularly the ventricles, and heart tissue, changes in expression patterns are likely to occur. Moreover, as different forms of heart failure can lead to differences in cardiac remodelling, heart failure subtypes may lead to differences in expression patterns compared to both non-heart failure and other subtypes.

The publicly available dataset used in the course, MAGNet (https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE141910), is comprised of RNA sequencing data from 366 biopsies of left ventricular free-wall tissue collected at the time of cardiac surgery from subjects with heart failure undergoing transplantation and from unused donor hearts with apparently normal function. These patients comprise four groups: non-failing healthy donors ("controls") and those with peripartum cardiomyopathy (PPCM), hypertrophic cardiomyopathy (HCM), or dilated cardiomyopathy (DCM). Limited additional data (such as age, gender, and ethnicity) are also available. Some additional phenotypic data can be found on the project's GitHub (https://github.com/mpmorley/MAGNet).

Each student group, consisting of approximately four students, has complete flexibility to devise a study that can be feasibly addressed with this data. They are then free to conduct that study, using their choice of analysis techniques and software. The study should probably include differential expression analysis and gene ontology term and pathway enrichment analyses; other analyses should be included at each group's discretion (network analysis, for example).

The course culminates with two graded presentations of each group's work. The first is a twelve-minute oral presentation, with an eight-minute question and answer session, delivered to the whole class and two (or more) assessors. The second is a complete scientific manuscript (a maximum of 3000 words, excluding references), prepared using Microsoft Word, delivered to the course coordinator via CANVAS. Students are also required to evaluate the conduct and performance of the other students in their group (also to be submitted via CANVAS).

Format

The course follows the problem-based learning (PBL) approach. Characteristic of this method is that learning is the result of an engaged interaction between academic staff and, particularly, students, fuelled by their experience and knowledge, with the objective of developing understanding and insights.

There will be two (brief, overlapping) lectures, focused primarily on preparing a proper scientific presentation and writing a scientific manuscript. The remainder of the sessions come in two forms: 1. open question and answer sessions and progress reports and 2. consultation hours with a phenotypic expert.

In the last session, each group will give an oral presentation describing their aims, methods, results and conclusions. It is mandatory for all students to attend the presentations and, hopefully, participate in asking questions of the other groups.

Contact details

Course Coordinator:

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Phenotype consultant:

Dr. Michiel Adriaens
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If you wish to e-mail Dr. Isaacs or Dr. Adriaens, please use your official UM e-mail account! E-mails from other domains may be filtered as spam.

Course objectives

The intended learning outcomes (ILOs) of the course are described below. Communication skills are a fundamental component of PRO4002. These include interacting and participating in a well-functioning group.

The primary aim of this course is to move from data through analysis to final products (i.e. presentations and manuscripts).

1. Given a dataset, formulate aims that can reasonably be addressed with that data. This goal should be extrapolated towards how a new study can be designed which might alleviate shortcomings with the current study.
2. Devise an analysis plan to quality control and evaluate the data, identify important transcripts, and attempt to infer relevant biology.
3. Working together as a team, with the goals of effective communication within the group, participation by all members in all elements of their study (ideally tailored to their individual expertise and interests), and equitable delegation of tasks.
4. Assemble and present a clear, cogent oral presentation describing the group's study and responding to questions from peers and assessors.
5. Write a concise scientific manuscript describing the aims, methodology, and results of the group's study and place those results into a broader context. Importantly, each group should show a willingness to accept feedback by incorporating comments and criticisms received during the oral presentation.

Table 1: Course ILOs aligned in the context of program ILOs

Dublin descriptor	**Final qualifications**	**Covered**	
		Course ILO #	*When needed, Comment M =math, C= computer science B=biology to clarify course emphasis*
1. Students have a breadth of academic knowledge	**1.1 CORE KNOWLEDGE** Students have profound knowledge and understanding of the field of Systems Biology, in particular the combination of the underlying scientific fields of Biology, Computer Science and Mathematics in the context of biological and medical application;		
	1.2 DISCIPLINARY KNOWLEDGE. Students are able to identify appropriate theoretical frameworks to address a System Biology problem. They can connect concepts across disciplines. They are able to integrate and apply models, theories, methods and techniques in the field of	**1, 2**	

	system biology and has thorough knowledge of a specialty within the study programme, or thorough knowledge on the interface of the study programme with other fields;		
	1.3 SYSTEM BIOLOGY KNOWLEDGE. Students have gathered extensive and detailed knowledge and understanding of biological and mathematical foundations of normal and pathological biological systems from molecule to population;		
	1.4 ACADEMIC KNOWLEDGE Student is able to comprehend new emerging concepts, theories and techniques and use these to initiate creative research for solving relevant problems in the field of System Biology	**1 – 5**	
	1.5 DISCIPLINE KNOWLEDGE Students have gathered detailed knowledge and understanding of mathematical methods for the analysis of data from biological experiments and for modelling complex biological systems		
	1.6 DISCIPLINE KNOWLEDGE Students have detailed knowledge and understanding of wet-bench experimental approaches and mathematical methods for the analysis of data from biological experiments		
	1.7 TOOLS KNOWLEDGE Students have detailed knowledge and understanding of tools for modelling complex biological systems	**2**	
2. Students can apply their knowledge and understanding, and problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study	**2.1 PROBLEM-SOLVING** Students have the academic skill to independently identify, formulate, analyse and suggest possible solutions to problems in the field of Systems Biology		
	2.2 CONDUCTING RESEARCH Students are able to comprehend new emerging concepts, theories and techniques and use these to initiate creative research for solving relevant problems in the field of System Biology. Students have the academic skill to are able to independently propose and conduct research on a problem concerning Systems Biology, including its experimental design, data collection and management, analysis, modelling and model validation, and report on it in a manner that meets the customary standards of the discipline. Students have the ability to perform original and innovative scientific and translational research in systems biology	**1 - 5**	
	2.3 CONTRIBUTIONS Students possess professional and academic skills to provide substantial and potentially leading contributions in a multidisciplinary team, crossing	**1 - 5**	

	the boundaries between disciplines within Systems Biology		
	2.4 CONTEXTUAL AWARENESS Students understand the context of Systems Biology within science and society and is capable of applying the knowledge and understanding gained in the discipline of Systems Biology in a broader social context;		
	2.5 PROFESSIONAL ATTITUDE Students have the ability to apply knowledge and understanding to complex, multi- or interdisciplinary problems, to formulate solutions and sustain arguments for those solutions in a professional fashion, both independently and in a team. Students are capable of applying knowledge and understanding in a way which demonstrates a professional attitude and ethical responsibility to their work or profession;	**1 - 5**	
	2.6 APPLICATION OF TOOLS Students have insight into and experience in describing and explaining biological systems with mathematical tools		
	2.7 DATA-BASED INSIGHT Students have insight into and ability to use mathematical and computer science approaches to convert biological data into new hypotheses and functional experiments	**1 - 3**	
	2.8 UNIFYING CONCEPTS Students have conceptual knowledge of and ability to deduce unifying concepts from distinct data sets		
3. Students have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments;	**3.1 SCIENTIFIC ATTITUDE** Students have a scientific attitude aimed at learning and the generation of new knowledge and viewpoints	**1 - 5**	
	3.2 CRITICAL ANALYSIS Students are capable of critical analysis and evaluation of research results obtained and derivation of new scientific insights. Students are able to critically analyse scientific publications or research proposals including hypothesis, problem definition, approach, interpretation of results, conclusions, limitations;		
	3.3 JUDGEMENT Students are capable of critical interpretation and evaluation of research results obtained and derivation of new scientific insights		
	3.4 SOCIAL RESPONSABILITY Students are able to discuss and predict the impact, effects and application of System Biology, biological and medical applications on human society and the environment they live in;		

	3.5 ETHICS Students have developed into responsible and ethical scientists are aware of the relevance and application of System Biology for human health.		
4. Students can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously;	**4.1 COMMUNICATION** Students are capable of communicating in English conclusions, as well as the underlying knowledge, grounds and considerations, to an audience composed of specialists or non-specialists. Students can communicate and create links with and between scientists and experts. Students have the ability to communicate and cooperate in multi- or interdisciplinary teams with focused assignments and collaborate effectively and appropriately with people from different socio-cultural and national backgrounds;	**3 - 5**	
	4.2 LEADERSHIP AND TEAMWORK. Students have the ability to lead an interdisciplinary team of individuals and are able to take adequate decisions within the team in the context of system biology applications and tools. Students have the ability to communicate and cooperate in inter and multidisciplinary teams with focused assignments and collaborate effectively and appropriately with people from different socio-cultural and national backgrounds;	**3**	
	4.3 EVALUATION Students have the capability to perform and communicate self- and peer-evaluation in order to continually improve themselves and their peers	**1 - 5**	
5. Students have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous	**5.1 INNOVATIVE ATTITUDE** Students demonstrate a creative and innovative attitude in their work that is driven by scientific curiosity and life-long learning;		
	5.2 CRITICAL THINKING Students have the ability to reach and support a conclusion in a logically structured fashion based on evidence, in an intellectually honest and reflective fashion and are able to comprehend new emerging concepts, theories and techniques and use these to initiate creative research for solving relevant problems in the field of Systems Biology.	**1 - 5**	
	5.3 LEARNING Students are able to optimally extract information provided / resulting from lectures, group assignments, journal clubs etc. Students are able to effectively use Problem-Based Learning		
	5.4 EXTEND KNOWLEDGE Students have the ability to independently maintain and extend professional knowledge and competences.	**1 - 5**	

1 Core Knowledge

The course expands upon the analytical skills introduced in MSB1005. It entails the development, implementation, and presentation of a complete analysis utilizing a publicly available RNA sequencing dataset. It emphasizes the further development of R programming, use of databases, and on- and offline tools. The project allows considerable latitude in devising a creative approach and implementation. Teamwork and scientific communication skills are a critical priority of PRO4002.

2 Applying knowledge and critical thinking

Students are given extensive freedom to use their creativity to devise, implement and interpret an analysis of this RNA sequencing dataset. An emphasis of discussion in the sessions is that a rationale should be provided for any steps that are taken; that is, critical thinking and discrimination should guide both the analytical steps taken and any inferences derived from those analyses.

3 Knowledge integration and formulation of judgments

Students work to utilize prior knowledge and integrate new knowledge to complete an (almost) complete scientific study, starting from raw data, through quality control, formulating a study objective, judiciously selecting analysis methodologies, integrating analysis results and communicating results. This process requires a methodical approach to decision-making.

4 Communication

The core objectives of PRO4002 are based on communication. This should occur, first, on the group level. Within each group, students will be required to effectively communicate their thoughts and ideas with their fellow group members. Consensus will need to be achieved on many topics, which, necessarily, requires compromise and professional attitudes.

On a second level, the course requires extensive communications skills in terms of orally presenting the group's findings and preparing a manuscript. This will require oral, written, and visual communications skills. The expectation is that master's level students should be able to perform these tasks at a reasonably advanced level.

5 Learned skills for further studies and employability

The ILOs in PRO4002 provide a solid background in skills that serve to enhance a student's ability to participate in PhD level education or gain meaningful employment. These include working as part of a constructive team, employing creativity to design a consequential study, and learning to utilize disparate software tools and methodological approaches to solve problems. Crucially, the communications skills required to work in a group, orally present a study, and construct a scientific manuscript will be cornerstones of any future study or work.

Course structure

The project consists of two lectures (the introductory session in MSB1005 and the project meeting in week two). The purpose of these lectures is, primarily, to focus on how to prepare a scientific presentation and write a scientific manuscript. Some topics germane to analysis of RNA sequencing data will also be presented. Attendance for these two lectures is mandatory.

Additionally, there will be several discussion meetings and consultations with an expert in heart failure. Four question and answer sessions are offered, spanning all three weeks of the course (the second two Mondays and the first two Thursdays). Three phenotype consultations will be provided (the first Wednesday and the two following Tuesdays).

The Q & A sessions will be open discussions concerning proposed analyses, interpretation and presentation/manuscript queries. The phenotype consultations provide an opportunity to ask an expert questions concerning heart failure. These meetings are not mandatory, although attendance is strongly encouraged.

Lastly, there will be a presentation session, during which each group will have an opportunity to present the details of their studies and entertain questions from the other students and assessors. This session is mandatory.

Literature

Mandatory Literature

There is no mandatory literature, as such.

Potentially useful resources include:

- The DESeq2 manual: https://bioconductor.org/packages/release/bioc/manuals/DESeq2/man/DESeq2.pdf
- The DESeq2 Workflow: http://bioconductor.org/packages/devel/bioc/vignettes/DESeq2/inst/doc/DESeq2.html
- The limma manual: https://www.bioconductor.org/packages/devel/bioc/vignettes/limma/inst/doc/usersguide.pdf
- WGCNA manual: https://cran.r-project.org/web/packages/WGCNA/WGCNA.pdf
- Ensembl: https://www.ensembl.org/index.html
- OMIM: https://www.omim.org
- GeneCards: https://www.genecards.org
- STRING: https://string-db.org
- PubMed: https://pubmed.ncbi.nlm.nih.gov
- Cytoscape: https://cytoscape.org
- clusterProfiler: https://bioconductor.org/packages/release/bioc/html/clusterProfiler.html
- GSEA: https://www.gsea-msigdb.org/gsea/index.jsp
- WebGestalt: http://www.webgestalt.org
- REVIGO: http://revigo.irb.hr
- Drug Gene Interaction Database: https://www.dgidb.org

Additional Literature

There are a huge number of potentially useful packages and tools available. The list above only (barely) scratches the surface. The best guide is to review papers (from PubMed) or do google searches to find useful software and implementation help.

Note that, ideally, the analysis plan for a study is pre-specified. In analyses like these, however, follow-up efforts may be, at least in part, dictated by the findings. For example, many types of enrichment analysis require a fairly large number of input findings. In the case of very few differentially expressed genes, either enrichment analyses are not possible or require a relaxation of the *P*-value threshold.

Assessment

Formative assessments

There will be no formative assessments, although Q & A discussions may help to shed light on how the summative assessments will be conducted.

Summative assessment

-Final Presentation

The final presentations will account for 35% of the final grade. See Appendix One for grading criteria.

-Final Manuscript

The manuscript will account for 55% of the final grade. See Appendix Two for grading criteria.

-Peer Evaluation

Each member of a given working group is required to give their fellow group members a grade on the standard 1 – 10 scale. The grade should be based on participation, contribution, and professional comportment. Each grade should be accompanied by a few sentences motivating the choice of grade. The peer evaluation contributes 10% to the course grade.

Grading

The standard Dutch grading scheme will be employed in PRO4002:

Table 1: Interpretation of the Dutch grading system

10.0	Outstanding
9.0	Very good
8.0	Good
7.0	More than satisfactory

6.0	Satisfactory
5.0	Almost satisfactory
4.0	Unsatisfactory
3.0	Very unsatisfactory
2.0	Poor
1.0	Very poor
'No grade' (NG)	Result cannot be determined

Grades should be ≥ 6.0 for each individual component.

Graded course component	Weight	Passing norm	If failed
Group Presentation	35%	≥ 6.0	Repeat presentation
Scientific Paper	55%	≥ 6.0	Revise manuscript
Peer Assessment	10%	≥ 6.0	Additional assignment

Re-sit

In case the student (group) fails the course, an opportunity to present a revised oral presentation or submit a revised manuscript will be offered in the first resit period.

Competition between exams

It is our aim to not plan two courses final exams of the same year on the same day. The final exams are scheduled in a way to ensure that students have one exam per day. All other course assignments should be due before the final exam date.

Course schedule

Date	Theme	Assessments and deadlines
MSB1005: Introduction to the Project		
Pre-meeting: Lecture	Introductory Session: Description of project, formation of groups	
Week 1: Getting the Project Moving		
Meeting 1: Q & A	Open question and answer session	
Meeting 2: Phenotype Consult	Session with phenotypic expert to discuss heart failure related questions	
Meeting 3: Q & A	Open question and answer session	
Week 2: Starting to Refine and Write		
Meeting 4: Q & A	Open question and answer session	
Meeting 5: Phenotype Consult	Session with phenotypic expert to discuss heart failure related questions	
Meeting 6: Lecture	Presenting Scientific Data and Writing a Manuscript	
Meeting 7: Q & A	Open question and answer session	
Week 3: The Home Stretch: Delivering the Presentation and Completing the Paper		
Meeting 8: Q & A	Open question and answer session	
Meeting 9: Phenotype Consult	Session with phenotypic expert to discuss heart failure related questions	
Meeting 10: Group Presentations	**Oral Presentations by Project Groups**	**The presentations will be graded by two (or more) assessors and comprise 35% of the course grade.**

*****Oral presentations will take place on Thursday, January 22nd.*****

*****Final manuscript due date: Friday, January 23th, 23:59.*****

*****Please submit your presentation prior to the session on the 22nd.*****

*****Submit your peer evaluations at the same time as the manuscript.*****

Exam inspection

The examiner decides on the grade for a written or other examination (i.e. presentation and paper) within a maximum of 15 working days after the date of the examination, and provides the Office of Student Affairs with the details required for issuing written or electronic proof of the assessment to the student within 15 working days. The Office of Student Affairs checks the grade list and uploads it in SAP. In some cases, this means that the OSA publishes the results on the same day as the results are handed in by the examiner. Students will find their final grade in the Student Portal. The examiner will organize the test (manuscript) inspection within 10 working days after publication of the grades. The examiner will see the students who request test (manuscript) inspection/feedback individually by appointment. When the inspection time occurs during a break, the coordinator can provide comments electronically (per request). Students are allowed to inspect their exam, but they are not allowed to take these with them or share the exam with other studiers or third parties.

Inspection

Within ten working days of the publication of your examination results, you will be able to have a look at your assessed work.

The date and time of the inspection will be published on the 'Student Portal > My Courses > Course Details'.

Complaint

Students can lodge a complaint during the inspection by using the complaint form. Please consult with the Office of Student affairs.

Appeal

For information regarding an appeal procedure, please read the information on the EER.

Fraud and Plagiarism

In order to protect the reputation of the degrees that you – as students – receive, instances of cheating or plagiarism are treated extremely seriously.

Fraud, including plagiarism, is understood as a student's act or failure to act that makes it partially or fully impossible to correctly assess his/her knowledge, insight and skills.

Plagiarism is understood as the presentation of one's own or other people's ideas or words without adequate reference to the source. This includes plagiarizing from published or unpublished work, such as utilizing written pieces from past students or other students in your group. If it is published, the work should be properly cited and paraphrased to avoid issues. ***The assessors reserve the right to use automated plagiarism detection software to identify potential cases of plagiarism.***

Any assignment is an individual piece of work, which means that plagiarism is strictly forbidden. Equally, the use of mobile phones, communication devices or any other information carrier (whether the phone or other device is turned on or off, used or not used, etc. is irrelevant) during an examination is also forbidden.

All cases of suspected fraud are sent to the Board of Examiners.

If the Board of Examiners concludes that anything has occurred in an examination that makes it partially or fully impossible to correctly assess his/her knowledge, insight and skills, they may impose a sanction in accordance with UM's policy on fraud, including plagiarism.

Programme rules

The EER addresses the following topics:

- Grades
- Scheduling and frequency of exams
- Form of the exams
- Oral exams
- Written assignments
- Determination and announcement of exam result
- Right of Inspection
- Period of Validity
- Retention period for tests
- Exemption
- Fraud
- Unsuitability

The Rules & Regulations address the following topics:

- Appointment, composition, tasks and working method of the Board of Examiners
- Examiners
- Registration and withdrawal for modules

- Additional modules
- Exemptions
- Grades and GPA
- Passes
- Attendance requirements
- Examinations
- Resits
- Disability provisions
- Degree, Certificates and Distinction
- Appeals procedure
- Directive on fraud

The student handbook contains a code of conduct that must be respected by all students during courses and exams. This policy is available on the Student Portal.

Inclusive classroom policy

The course coordinator upholds Maastricht University's commitment to ensuring equality and valuing diversity. UM recognizes that our individual differences can deepen our understanding of one another and the world around us, rather than divide us. In this course, people of all ethnicities, genders and gender identities, religions, ages, sexual orientations, disabilities, socioeconomic backgrounds, regions, and nationalities are strongly encouraged to share their rich array of perspectives and experiences. If you feel your differences may in some way isolate you from UM's, please speak with the course coordinator early in the period about your concerns and what we can do together to help you become an active and engaged member of our class and community. For some of you, the following resources may be helpful:

Diversity at the Core - Diversity and Inclusivity policy
Learn how you can apply for disability support
Informatie Disability Support Office voor studenten Universiteit Maastricht
Community support: https://www.maastrichtuniversity.nl/support/during-your-studies/student-guidance/innbetween-student-chaplaincy
UM mental-health support: https://www.maastrichtuniversity.nl/support/during-your-studies/student-guidance/psychological-support
Confidential counselor: Wendy Geijen, Bonnefantenstraat 2, room B1.23, 6211 KL Maastricht, +31 6 2803 5033 wendy.geijen@maastrichtuniversity.nl

Appendices

Appendix One: Criteria for the grading of oral presentations.

Oral presentations will be assigned a group grade. Assessors will view and grade the presentation using the form below. Final scores will be the average of the individual assessors scores.

1. Presentation skills:				
1	2	3	4	5
• No/poor eye contact		• Direct eye contact		• Commands audience attention
• Read from notes		• Minimal use of notes		• No use of notes
• Poor body language (hyperactive/ stiff/nervous)		• Appropriate body language (relaxed)		• Fluid body language (relaxed and self- confident)
• Substantially over/under time		• Slightly over/under time		• Precisely timed
• Flustered by questions		• Adequately answers questions		• Fluently answers questions; can go beyond basic answers
2. Slide design				
1	2	3	4	5
• Poor contrast		• Good contrast		• Bold
• Illegible		• Readable		• Highly legible
• Poor use of figures/tables		• Good use of figures/tables		• Compelling figures/tables
• Too busy		• Appropriate amount of content		• Tells the broad story with no need for verbal content
• Unstructured		• Appropriate structure		• Logical structure (“flow”)
3. Scientific content				
1	2	3	4	5
• Fails to describe aims		• Aims described		• Clear aims with context
• Methods unclear		• Clear methods		• Methods well-described and appropriate
• Sources unclear		• Clear sources		• High-quality sources

• Fails to draw (appropriate) conclusions		• Draws appropriate conclusions		• Conclusions clear and placed in context
4. Did it hit the target?				
1	2	3	4	5
• Level not appropriate for audience		• Level suitable for audience		• Level tailored to audience
• Fails to educate audience		• Generally adds to audiences' understanding		• Increases audiences' understanding and awareness of the topic and context

Appendix 2: Criteria for the grading of manuscripts.

Manuscripts will be assigned a group grade. Assessors will grade the manuscript using the form below. Final scores will be the average of the individual assessors scores.

In this example, the subject area, criteria, and number of points for the subject area are detailed in the first three columns. A hypothetical set of grades, on the usual 1 – 10 scale, are given in the fourth column. The "total" column is the number of points multiplied by the grade for each subject area; these are then summed and divided by the total number of points to derive an overall grade for the paper. The last column, which was truncated to make the figure legible, contains comments from the assessors.

	A	B	C	D	E	F
1				Group 1		
2	Subject Area	Criteria	Points	Grade	Total	Comments
3	Title	Clear, concise	3	8.9	26.7	descriptive, concise, no mention of RNAseq/transcriptome/tissue, non-standard capitalization
4	General Organization	Sensible organization, logical flow to manuscript	5	9	45	followed standard manuscript format, no page breaks
5	Length	Within word limit	5	10	50	length right in the middle of suggested range of 3000 - 4000
6	Abstract	Clear, good description of study and main findings, length	10	8	80	good length, mixed tenses, no numerical results
7	Introduction	Sufficient background, clear statement of study problem	10	8.25	82.5	good background, mixed tenses, mentions conclusions, clearly stated objectives
8	Materials and Methods	Sample ascertainment, ethical statement, data generation, statistical methodology	20	8	160	too many sub-headers, misstatement of moderated t vs. multiple testing, could use additional
9	Results	Clear, concise, accurate	20	7.5	150	too many sub-headers, too many digits in some p-values, greater explanation needed for some
10	Discussion	Place findings in context	10	8.5	85	generally well described and good placement of findings in context, misuse of "metadata", amb
11	Tables and Figures	Clear, descriptive, in order of citation, added value over text	10	8.75	87.5	appropriate number, generally informative (could be described a little better in some cases, suc
12	Table and Figure Legends	Descriptive enough to follow without text	5	9	45	generally descriptive, often mentioned method, generally complete
13	References	Sufficiently used, formatted, in order of citation	5	8.5	42.5	suitable number, appropriately cited, some were rather old
14	Spelling/Grammar/Writing	Minimal errors, concise, consistent	5	8	40	generally good with a few errors, fairly concise, consistent, readable
15			108		894.2	Sum
16					8.3	Final Grade