ERS 335
Restoration Ecology

2019 Syllabus

The professor for the course is Stephen D. Murphy

Steve has a B.Sc. (Hons.), Ph.D. in Biology.
Professor, School of Environment, Resources & Sustainability, University of Waterloo.
EV2-2046A. x35616. stephen.murphy [at] uwaterloo.ca.

@prof_smurph; profsmurph; see also @CASIOPA_ON
https://www.linkedin.com/in/profsmurph
https://ca.linkedin.com/in/casiopa
Office hours: 0830-1200; 1300-1500 (except when I am teaching other classes)
(I recommend appointments for urgent matters - but you can drop by as you like)

Steve is also Editor-in-Chief of Restoration Ecology, Chair of the Centre for Applied Sciences in Ontario Protected Areas, and Board Member of the Ontario Invasive Species Centre. He is also short, voluble, has a family, and, apparently, does not sleep.

ERS 335 has two required texts (first is via @ UW Bookstore or other sellers; used copies are OK).

• Newcomb L; Morrison. G. 1977. Newcomb's wildflower guide. Little Brown & Co.[1]
• Allison SK and Murphy SD Routledge Handbook of Ecological and Environmental Restoration.
https://www.routledge.com/Routledge-Handbook-of-Ecological-and-Environmental-Restoration-1st-Edition/Allison-Murphy/p/book/9781138922129. I recommend purchasing or renting an e-version; the 6-month rental is cheapest (~$35.00 CDN). We will use almost every chapters in the 600+ page book.[2]

All other readings will use sources available on-line via LEARN; there is no extra cost.

---

[1] This is used in most of our field ecology courses so if you're keen on ecology, you may already have it; you will get a lot of use out of it.

[2] Yes, the 2nd author is me. No, I will not get rich by having you buy or rent a copy; I get about 50 cents per hardcopy sold and much less for e-rentals; we sold/rented a LOT of copies and, so far, I've made about 80 cents an hour on this. Stu Allison and I edited the book because we wanted a modern book that people could use to teach restoration ecology; we did not do it to make any real income.

This is the ERS 335 class, field activities, & assignment schedule

DATE/TOPIC/READING – MWF 1130-1220 (MC 4040 OR OUTSIDE - YAY!)	CLASS OR FIELD ACTIVITIES & ASSIGNMENTS	LEARNING OUTCOMES
Sept 4: Foundations & Applications of Ecological Restoration *Murphy and Allison 2017; Choi 2017; Higgs and Jackson 2017; Cabin 2017; Allison 2017*	We will discuss the changing nature of the broad conceptual, theoretical and methodological frameworks of restoration ecology	Understand the scope & practicalities of restoration ecology and its frameworks (and what the heck a framework is...)
Sept 6: Biodiversity as a goal, indicator and outcome of restoration ecology *Booth et al. 2010*	Anticipating on our field skills classes (2 weeks hence), discuss what we might find and how it relates to restoration ecology	Determine how well biodiversity serves the concept of restoration ecology
Sept 9 Research communication in restoration ecology *See links on LEARN for this class*	We'll discuss how to communicate ideas effectively	*You have Term Assignment Part 1 due in 18 days*; this is meant to show you how to succeed for this class milestone and for employment generally
Sept 11: Experimental design in restoration ecology	We discuss controlled and mensurative experimental designs in restoration ecology	Learn to design experiments in restoration ecology
Sept 13: Principles of data analysis in restoration ecology *Murphy 2018 (primer on stats)*	We examine parametric, non-parametric, and multivariate analyses in restoration ecology	Learn the principles of analyses in restoration ecology
Sept 16: Practicum in data analysis in restoration ecology *See dataset provided in LEARN folder for this class* *Murphy & Brook (2019)*	We do a class exercise where we use the open source program r to analyze a real dataset from a restoration ecology project	Learn how to do analyses using software; *prepares you for Term Assignment Part 2 – due in abou6 6 weeks but it will sneak up on you...*
Sept 18: Synthesizing data and measuring outcomes of ecological restoration *Wortley et al 2013*	Provides theoretical foundations of how data supports decisions in restoration ecology	Learn the fundamental options of measuring outcomes in restoration ecology

Sept 20: Field skills in Applied Ecological Restoration I *Bring Newcomb's Guide & other field class materials from Steve*	We go outside and do Site Assessments of meadows using herbs and forbs as indicators; if the insects are active, we will add those to our indicator list	Learn to assess meadow sites and plan site-based ecological restoration
Sept 23: Field skills in Applied Ecological Restoration II *Bring Newcomb's Guide & other field class materials from Steve*	We go outside and do Site Assessments of riparian zones using herbs and forbs as indicators	Learn to assess riparian sites and plan site-based ecological restoration
Sept 25: Field Skills in Applied Ecological Restoration III *Bring Newcomb's Guide & other field class materials from Steve*	Guided by our Site Assessments, we go outside and continue the process of restoring meadows, and riparian zones	Learn to implement ecological restoration
Sept 27: No class	**Term Assignment Part 1 is due today at 2300 h. via LEARN**	**The goal: raise your game at scientific/professional writing**
Sep 30 Restoration ecology at population scales *Murphy et al 2017* *McKay et al 2005*	Provides theory behind how population scale restoration works	Use population theories in problem solving for restoration ecology
Oc 2 Restoration ecology at community scales *Palmer et al 1997; Harris 2009* *Kardol & Wardle 2010*	Provides theory behind how community scale restoration works	Community scales are perhaps the major focus in restoration ecology, so this shows how we use theory to problem solve
Oc 4 Restoration ecology at landscape scales *Bell et al 1997; Perring 2017*	Explores examples of spatial processes (landscape ecology) in restoration	Use landscape ecology theories & apply to restoration ecology
Oc 7 Governance, law, policy and restoration ecology *Cliquet 2017; Mansourian 2017*	Natural & physical sciences are important but social science issues may be even more critical to restoration ecology	Examine the legal, governance and government (policy) drivers for and against restoration ecology
Oc 9 Social capacity and ecological restoration I *Metcalf et al 2017; Packard 2017; Baker 2017; Heneghan & Heneghan; Edwards et al 2017*	Building social consensus and social capacity was once overlooked in restoration ecology; this addresses that form gap	Allows us to understand how social processes can help or hinder restoration ecology solutions as this is a big part of being a professional

Oc 11 Social capacity and ecological restoration II *Metcalf et al 2017; Packard 2017; Baker 2017; Heneghan and Heneghan; Edwards et al 2017*	Building social consensus and social capacity was once overlooked in restoration ecology; this addresses that form gap	Allows us to understand how social processes can help or hinder restoration ecology solutions as this is a big part of being a professional
Oc 14 No Class - Thanksgiving **Oc 16 No Class - Fall Study Break** **Oc 18 No Class - Fall Study Break**	I highly recommend getting as much of Term Assignment Part 2 as you can; catch up on your reflections and course notes for this and your other courses. That said, do take at least one of the weekdays – in addition to Thanksgiving - off for self-care or (if it works better for your lifestyle) take some half-days for yourself.	
Oct 21 Ecological restoration and economics I *Bowers & Norris 2017 Baumber 2017*	The business and broader economics of restoration ecology are a driver to the green economy	Gain a high level but still practical understanding of green economy and restoration ecology
Oc 23 Ecological restoration and economics II *Blignaut 2017; Williams 2017*	Delving more deeply into the restoration economy's theory and practice	Be able to use case studies for comparative understanding and analysis of restoration economy projects
Oct 25 Restoration Ecology in Tropical Ecosystems I *Byers 2017; Brown 2017; Segura 2017; Overbeck and Muller 2017; Lamb 2017*	Shows how people approach restoration ecology in different types of tropical ecosystems	We'll understand if there anything unique about restoration in the tropics
Oct 28 Restoration Ecology in Tropical Ecosystems II *Byers 2017; Brown 2017; Segura 2017; Overbeck and Muller 2017; Lamb 2017*	Shows how people approach restoration ecology in different types of tropical ecosystems	**Term Assignment Part 2 is due today at 2300 via LEARN** We'll still understand if there anything unique about restoration in the tropics
Oct 30 Restoration Ecology in Temperate Ecosystems I *Kulluvainen 2017; Stanturf 2017 Prach et al 2017; Hanberry et al 2017*	The temperate zones include much of Canada, so we need to understand how restoration is done here – and in places like Canada	We'll understand if there anything unique about restoration in the temperate zones

Nov 1 Restoration Ecology in Temperate Ecosystems II *Kulluvainen 2017; Stanturf 2017 Prach et al 2017; Hanberry et al 2017*	The temperate zones include much of Canada, so we need to understand how restoration is done here – and in places like Canada	We'll understand if there anything unique about restoration in the temperate zones
Nov 4 Restoration Ecology in Desert/Dryland Ecosystems I *Abella 2017; Mucina 2017*	Deserts and drylands tend to get neglected in some cases and over-pampered in others; we will explore what happens	We will understand when we should or should not try and restore these ecosystems (and if so, how)
Nov 6 Restoration Ecology in Desert/Dryland Ecosystems II *Abella 2017; Mucina 2017*	Deserts and drylands tend to get neglected in some cases and over-pampered in others; we will explore what happens	We will understand when we should or should not try and restore these ecosystems (and if so, how)
Nov 8 Restoration Ecology in Freshwater Ecosystems I *Smith and Chadwick 2017; Jeppesen et al. 2017; Keddy 2017*	Freshwater ecosystems are the 'canary in the coal mine'; we'll explore options for ecological restoration	We will understand how freshwater ecosystems are affected by disturbance and how we can restore them
Nov 11 Restoration Ecology in Freshwater Ecosystems II *Smith and Chadwick 2017; Jeppesen et al. 2017; Keddy 2017*	Freshwater ecosystems are the 'canary in the coal mine'; we'll explore options for ecological restoration	We will understand how freshwater ecosystems are affected by disturbance and how we can restore them
Nov 13 Restoration Ecology in Marine Ecosystems *Burdick and Adamowicz 2017; Coen and Humphries 2017; Hancock et al 2017*	Marine ecosystems are perhaps a big mystery to most because they are hard to access; we'll mainly explore inshore and near shore types of ecosystems	Learn how we can restore such iconic ecosystems as coral reefs and estuaries
Nov 15 Urban Restoration Ecology *Norris et al. 2017*	As more people live in urban areas, the need to restore is urgent; we'll explore how	We will have a good grounding of how ecological restoration is done in a seemingly impossible set of circumstances
Nov 18 Restoration Ecology and Invasive Species *Dudney et al 2017*	Invasive species can be a problem for restoration; we'll explore how we should research and act	We will understand how to define thresholds for action on invasive species in restoration ecology

Nov 20 The Big Picture of Restoration Ecology I *Trevenen et al 2017; Chazdon and Rey Benayas 2017; Murphy 2018*	The regime changes caused by anthropogenic climate change and the tools needed to address these Earth scale issues will be explored	We will learn the scope of the problem in detail and how we can cope with such widespread and rapid degradation – how do we effect restoration in a hostile social/environment?
Nov 22 The Big Picture of Restoration Ecology II *Trevenen et al 2017; Chazdon and Rey Benayas 2017; Murphy 2018*	The regime changes caused by anthropogenic climate change and the tools needed to address these Earth scale issues will be explored; we will have some focus on strategic issues today	We will learn the scope of the problem in detail and how we can cope with such widespread and rapid degradation – how do we effect restoration in a hostile social/environment?
Nov 25 – No Class	**Term Assignment Part 3 is due today at 2300 h via LEARN** **There is a 48-hour grace period of this assignment if you need it**	
Nov 27 The Future of Restoration Ecology I *McDonald et al 2016; Higgs et al 2018a,b; Gann et al 2018; Hobbs et al 2009; 2014a; 2014b; Murcia et al 2014; Murphy 2013b; 2013c*	We'll discuss how controversies erupt, especially when long held ideas are challenged	Novel ecosystems are ones not likely to be restored to a 'historical' condition; we seek to answer if this is defeatist or simply practical
Nov 29 The Future of Restoration Ecology II *McDonald et al 2016; Higgs et al 2018a,b; Gann et al 2018; Hobbs et al 2009; 2014a; 2014b; Murcia et al 2014; Murphy 2013b; 2013c*	We'll discuss how controversies erupt, especially when long held ideas are challenged	Novel ecosystems are ones not likely to be restored to a 'historical' condition; we seek to answer if this is defeatist or simply practical
Dec 2 Course Evaluation & Exam Review	Evaluate the course and discuss the exam (kind of self-explanatory…)	You will have a chance to improve the course and will get a lot of exam hints and help here

ERS 335 Course Scope

This is a transdisciplinary course that reflects the essence of ecological integrity and restoration ecology – but there still is a clear emphasis on natural/physical sciences, integration with social sciences & engineering, ecosystem function, and quantitative analysis.

Before and After Ecological Restoration – Cape Breton NS (15 Years Apart & $275,000 Investment)

Course learning objectives

By the end of this course, you will be able to:

- Acquire and improve field identification skills of organisms for the purposes of ecological monitoring (and assessment) in a restoration ecology context
- Acquire and improve experimental design and advanced data (quantitative/statistical) analysis skills related to measuring outcomes of ecological restoration; you will be at an intermediate level of skill and competence for experimental design and analysis using parametric and non-parametric statistics
- Perform basic implementation of ecological restoration in a long-term project (i.e. an ongoing restoration project implemented and monitored by UW students every year)
- Apply explanatory theories to case studies or examples at various spatial and temporal scales
- Critique & evaluate use of explanatory theories in their application in case studies
- Synthesize lessons from case studies in terms of general practice of restoration ecology and assessment of ecological integrity
- Using the comparative method, apply learning outcomes to your assignments, the final exam, and beyond
- Use all above skills in a consultant style report (professional communication) and in creative design for ecological restoration

How I Grade You in ERS 335
(See the 335 Assignment Folders in the Course LEARN Site for More Details)

- Term Assignment, Divided into 3 Parts (3 Submission Dates): Each student will write a formal technical report in the format used by consultants. This ensures you have yet another skill set for your life experience and that looks good on a CV/resume. Start plotting out this assignment early and start each section as early as possible. I've seen too many students in the last 20+ years cause themselves grief because of poor time management and a failure to heed this advice. Everything is submitted via LEARN so that's where you will get feedback and grades from; I tend not to use the LEARN gradebook as it is of dubious reliability but the grade for each assignment is provided during feedback to you.
  o Term Assignment Part 1. Submit a draft introduction contextualizing an ecological restoration study. Weight: 10% of final grade; Word limit: 1000 words. **Due Date is September 27 at 2300 h.3 via LEARN**
  o Term Assignment Part 2. Data Analysis. Analyze data on an ecological restoration study using open source software and submit the Results in a coherent format. Weight 10% of final grade. **Due Date is October 28 at 2300 h. via LEARN.**
  o Term Assignment Part 3. Writing a Complete Research/Consultant Style Technical Report on An Ecological Restoration Study. Word Limit: 7500 words (not including tables or literature cited). Weight: 30% of Final Grade. **Due Date is November 25 at 2300 h. via LEARN. You also get a 48-hour grace period (penalty free) if you really need it – a free extension in other words.**

- A final exam is based on our discussions (including all lecture and field days). Scheduled in December exam period by Registrar. Do not schedule an early vacation because the Registrar can schedule us for a late exam or there can be a snow day forcing a late reschedule. The exam will focus on point form explanatory style answers to questions largely posed as synthesis or problem-solving exercises. Typically, I will have 6-8 questions but there will be some choice in selecting options within the questions given. If you like to skip the last classes on principle - that approach would be a very bad idea. Despite the scary looking weighting given to the final exam, this is the type of weight and format that professionals must master when becoming professionally certified. Your grade on the final exam is maximized if you go to class diligently, synthesize your own class notes + my slides each week - keep up with the course, discuss any gaps in your understanding with me + TAs + friends, review practice questions that I send out during term, and step back and give the whole course some deep thought. Basically, if you perform as scholars, you will do well.

---

[3] To reinforce the obvious: 2300 h means 1100 PM. At night. An hour before midnight.

Course Processes & Other Key Information

Experiential Learning: We Have 3 Classes Devoted to Field Skills Practicum: This year, I will be in England at a Royal Society meeting on Restoration Ecology during this phase. We have an excellent TA who will go outside with you and do some data collection on the type of plants found at areas undergoing ecological restoration. You also will do some seeding for ecological restoration. This ensures you get some experiential learning during the late summer/early fall.

You are expected to review assigned readings before and after each class. I selected peer-reviewed readings (see LEARN Lessons Folder & Class Schedule) for your use as background on the topics we will discuss in class and as sources for your assignments. You can also use these to help you find other relevant references. I follow the readings in class and base my lessons on them; whatever we emphasize in class will be emphasized on the final exam. I do not play Trivial Pursuit on exams.

Your assignments will be submitted online via LEARN to reduce use of paper. They are due @ 2300 h on the date indicated in this syllabus. They will be graded and commented on using the track changes feature of MS Word. 10 MB limit on file size. Call them surname_firstname_335AX where X = 1,2, or 3. Don't take this too literally; swap in your own name please.

Read, explore databases, & start work on assignments during the first week of classes – you can do a lot of the work on reports early; if you don't, you will be cursed (and will curse). Late assignment penalties apply as follows and to all cases except for those few extensions granted for medical reasons or for professional counseling for serious personal problems – extensions can be granted with proper documentation or discussion well in advance. For those who are in their 2A term, take note: This can be a very challenging term. Often, you go through personal changes. I am sympathetic but we need to communicate; if you identify a problem of any type, come and see me ASAP. All discussions confidential, we can usually work out a better path.

There are normally penalties for submitting the any of the parts of the Term Assignment after the due date. My approach is that for the first 2 days, I only apply a relatively small penalty; it means that if you are 6 hours late you might as well take another day or two anyway to make it really good to compensate. Specifically, for each assignment, if the assignment is up to 48 hours late, a flat 10% is deducted. Exceptions are considered for medical/related reasons AND there is a nice little grace period (penalty free) for 48 hours for Assignment 3 only (you're welcome) – after that, then the penalties begin as described here. If the assignment is >48 and < 144 hours late, a flat 25% is deducted. Assignments later than 144 hours (7 days) past deadline receive a grade of 0.

Resources for You – University Policies, Your Rights, Mental Health Help, AccessAbility

Each course must refer you to this webpage with many resources (policies, mental health help and so forth): https://uwaterloo.ca/environment/undergraduate-teaching-resources. Beyond that, make all efforts to communicate with me if there are acute or chronic struggles that affect your class attendance or course performance – I know it is tough to admit you need help or to trust anyone. The earlier we address issues and find a success path, the better; I am willing to assist and alter the standard path.

A Standard Refresher That I Provide to Assist You to a Successful Path in ERS 335 and Beyond:
Surviving & Thriving in University/Expectations and the Meaning of Grades in University

In high school, mastery of basic foundations and expected efforts often yield grades above 90%. In University, they do NOT; meeting expectations at a level commensurate with your program level (e.g. 1A, 3B, 4B) typically earns you a grade around 75%. That means the remaining 25% is for extraordinary effort. It also means that if you never progress and submit the same level of work, what earns you a 75% in 1A will probably earn you a 65% in 2A, 55% in 3A and less than 50% in 4A. This rarely happens because people begin to learn the system and get better as they progress during University.

This is what students rarely consider when they first enter university; the assumption is that a good and basic effort will yield a high grade. Nope. That means you get a good and basic grade – around 75%, though one could choose any baseline (in the UK, they choose around 50-60% for this but that really hurts students going for scholarships internationally where all others use the 75% basis for 'meets standards'). Our job is to make you better and show you how to be the best if you're willing to put in a lot of effort and/or work efficiently.

This is why I – or any professor – will say you need to start assignments immediately, finish early, write many drafts or you need to review class lessons immediately after they happen and do the mandatory readings before and after (taking notes on these – synthesizing main points) or you need to reflect and synthesize the big ideas or principles in each class/reading/tutorial and consider how case examples – including ones in current events you can read about in the news – are examples of how these principles/idea are applied. You want an A+? You can earn it – with a lot of work.

University is full time; think of it as a job – one that can be fun and rewarding if one has a good attitude and dedication. If you must work more than 10 hours a week because of finances, I'd recommend taking no more than 4 courses a term; it means perhaps an extra term in total over 4-5 years or taking some higher credit weight courses (e.g. ERS has 2 triple weight and 4 double weight courses in spring terms) but it is worth it. You need to devote about 10-15 hours per course each week to achieve above 80% in each course; this means 40-75 hours per week if you are taking 5 courses so that leaves 93 hours a week for all else. Not too bad but since you'll want to sleep, eat, have some non-academic fun, and allow for days when you are exhausted or ill, it is less time than you think. Work-life balance is something that we all must learn; it is a skill and an art.

Personally, I recommend taking even an old-fashioned paper calendar of some type and working BACKWARDS from the end of each term. You won't know exact dates of your final exams until the end of the 2nd month of each term but you will know you have X number of exams during the final month of term based on course syllabi. Add in your test, quiz, or assignment due dates for all courses and add in times when you anticipate big social events or other happenings. Then add in a schedule where you set hours/times to start assignments and review course materials, synthesizing them in anticipation of your tests and exams. Stick to this schedule. If you maintain a great routine, you will succeed.

Grades can be interpreted a bit differently depending on the professor and type of course (and in some places in the world – like the UK – they use a different basis for grading, i.e. they rarely assign a grade higher than 80% so the mean and median grades and interpretation of student success is different than in Canada). Below, you will find a decent description of what grades mean in my courses and in many SERS courses. Personally, I tend to grade by range-blocks (e.g. 100, 95, 90, 85, 80…) because I examine

the quality of an answer – based on the criteria below – and then transform them into a numerical grade reflective of the effort and achievement of a student. Higher grades = better completeness, nuance, creativity, and technical abilities.

- A+ (90% and above): Your work gives an in-depth, reflective or analytical answer that addresses the question beyond a fundamental outline of the main issues; essentially, the answer makes use of class discussions, class resources and other credible sources or ideas and translates these into an answer that produces a workable strategic assessment and operational solutions. Grades in this range or the next one below usually reflect the fact that a student has made a serious and successful effort to review material daily or weekly, anticipate assignments by starting them early and drafting several versions before handing them in, considered the synthesis and specific issues for the course material, made notes on key points of the readings assigned or read extensively beyond mandatory readings or expectations for an assignment, and explored the current events/news relevant to the course or assignment material to mine comparative examples. In sum, the highest grades reflect extraordinary effort

- A/A- (between 80% & 90%): Your work addresses the fundamental issues related to the question and provides a useful and concise summary of them. The upper end of this range means that you have taken reasonably intense efforts at going beyond the materials provided, insights covered in class or the literature assigned. On the lower end of this grade range, your answer does not take the time or provide enough depth to convince the reader that you have great insight into the issues or the technical knowledge to produce an operational solution

- B-/B/B+ (between 70% & 80%): Your work shows that you have most of the basic elements and knowledge related to answering the question but the text and answer itself is a bit muddled or disorganized. Answers receiving the lower end of this grade range normally are ones that reflect a more superficial understanding of the issues related to the answer or are not well written.

- C-/C/C+ (between 60% & 70%): You generally addressed the main requirements of the question or an assignment, but your answer shows less than rudimentary mastery of the basic materials and no real cohesion in your answer. If it is a written report, it usually reflects some rather poor sentence structure, grammar, spelling, and/or organization.

- D-/D/D+ (between 50% & 60%): You had enough elements in your work to convince me you have some vague notion of the requirements and key concepts but that's about all; there is usually no cohesion at all on an exam question and if it is a written assignment, your answer is barely readable but does contain enough to pass.

- F (less than 50%): The work gives me a strong suspicion you didn't care, didn't bother, or didn't attempt to comprehend the question and made little to no effort – either that or you truly missed the point of the question or assignment. This usually reflects a very rushed job on an exam or

written assignment (no drafts and no real editing); for assignments, it means you probably failed to meet even the most basic requirements (e.g. did not pay attention to instructions or missed key objectives). If it is around the 40% range, it usually means you made some effort but did not address the major issues or wrote poorly; less than that usually means you had no clue or didn't care to get a clue. The answer may be incoherent, contradictory, or plain wrong. It may not even address the question asked. <u>In some cases, however, it can reflect a life crisis or a hidden learning challenge that we can use to diagnose, get help and solutions, and in those cases, we then eliminate this grade and work out a plan to fix things</u>. I do that if the same situation arises and you passed with, say, a D-level grade too.

The above is a good summation of the principles and guidelines when one is marking on a basis of the quality of the answer.

In some cases, the assignment or exam lends itself to a very strict and point-by-point grading rubric. Annotated bibliographies, multiple choice or true-false questions on exams and perhaps brief lab reports are examples where there is less reliance on a qualitative framework for grading and more on a tallying rubric where X gets you Y points. I tend not to use it much because life is not multiple choice; it is all reflection, essay and synthesis.

How does a student write a good paper or exam answer?

No matter what the approach, I think students sometimes miss the two most important points when they answer exam questions or write an assignment:

1. Is this answer or assignment any good – is it great (beyond expectations; A+), perhaps?
2. Did it address the question/follow the instructions/focus on the main goals of the assignment or exam question?

Point 1 is rather obvious and yet so many people miss it; people get caught up in life and in scrambling to juggle (usually) 5 courses with multiple assignments and deadlines and class attendance (one hopes). The mind's focus then goes to the simple stuff: how many words do I need to use (what is the word limit – minimum, maximum or both?). That simple stuff is the wrong question and the wrong attitude – you don't get graded on how many words you use; yes, some professors levy heavy penalties for exceeding the word limit and you need to watch that. Word limits are usually no more than attempts at telling you when to stop and that's all. Simply ask yourself upon reading your draft versions: Is this any good? Be honest with yourself.

Point 2 is also trite and yet also missed by many; follow the instructions and focus on what is demanded and emphasized as being important. Do you have an assignment where it is a scientific or consultant style report and 80% of the grade weight is on the discussion? Well, then, 80% of your attention and effort should be on the discussion, right? You'd be surprised. I've seen people who clearly spent days formatting a cover for their report (said cover is worth ZERO marks) and then handed in a 1-page discussion when there were another 8-10 pages allocated to discussion and the concomitant weight of the grade. And then students get shocked when they fail the assignment; a little sober reflection on the sheer imbalance and mismatch between efforts on each part would have saved some tears, I think.

Content-wise, the effort needed varies depending on circumstances and questions asked. For exam answers, the total weight (number of marks) can sometimes reflect the number of 'points' tallied or expected. That happens with short answer or multiple-choice type exams. However, whether it is more of an essay style or even a 'point-form exam' (which is not the same as 'tallying points' – it just means you don't have to use proper essay style), the weight simply gives you an idea of the depth and breadth expected in an answer.

- My rule of thumb was that a 20-25-mark weight indicated a very deep and sophisticated answer was expected. I never bothered to worry if I had 20 or 25 points or items because the professor could easily give the same great mark to someone who took 10 items and explained them more in depth as to someone who took 15 items and explained them well but perhaps with a less depth for each but more integration of the ideas and items. I simply tried to do my best where 'best' meant weeks of work/prep.

- Sometimes the depth vs. breadth approach depended on the question being asked but in most cases, it is a challenge question to the student: Show me you understood the concepts, explain them, show me how these address the question, raise any issues about missing information and how we should research it/find it, and impress me with your sophistication and well-read nature (did you read beyond the mandatory material and did you reflect and practice answering questions all term?). These big questions are usually synthesis and reflection – the big picture of the course and about strategic ideas.

- A 10-15-mark weight is often one that is a problem-solving one; greater mark value usually means more detail is expected or it is cross-linked between several topics and lessons and perhaps multi or transdisciplinary in nature.

- Questions around 5 marks are usually more reductionistic and focused on one idea.

- Thus, I worried less about how many actual marks were allocated and more about what the relative number of marks/weights against the whole exam can tell me about the type of answer expected – meaning the marks reflect the quality of answer, translated to a numerical assessment.

The writing style often bedevils students because as one begins to learn terminology and reads peer literature, there is a temptation to emulate the complex language and sentence structure in some of these sources to sound smart. In some cases, students emulate the worst excesses of peer literature. My advice: KISS – keep it simple, stupid. Write simple (not compound) sentences that focus on one subject, one verb, one object. Structure the paper so that the paragraphs each focus on one main point and the series of paragraphs lead to an emergent and important theme, that is often reinforced by active voice subtitles to help readers focus. For example, here are two possible subheadings:

- Importance of diversity to ecological restoration.

- Increased genetic diversity increased the successful outcome of ecological restoration.

The second subheading tells us what the series of paragraphs that follow lead us too; this is not a murder mystery novel so don't worry about giving away the plot. Don't bury the lede.

As far as first vs. third person is concerned, unless the instructions demand one of the other, it does not matter. I tend to use first person, active voice because it is less awkward to write and produces clearer and better writing.

Don't waste time and space on rhetorical flourishes, pedantic comments, burying the lede, irrelevance, half-a-story, or chattiness.

For example, this is bad writing: "A study that was done in Australia in 1987 by DS Smith, FP Jones, AB Uriah, and Dr. Robert Q. Important-Person showed that restoration was good."

The citation style is wrong, most of the sentence is not needed, why call the last author by a full name, and this never tells us why we should care.

This is better: "Smith et al (1987) determined that connectivity analysis improved landscape scale restoration of sand-dune ecological communities' outcomes by 80% vs. use of Landsat satellite mapping because connectivity focused on animal and plant migrations, fecundity and survival in real-time." This tells us a lot; there may be more we could add but it gives us a clear idea of what was done and what the relevance is.

The bottom line: Ensure your submission addresses the question, ensure that it is good (that means a lot of hard work with multiple drafts written well in advance), and ensure that it has evidence and proper citations to back your interpretation and claims.

That's a reasonably detailed guideline to grading in university, or at least the way that I (and many colleagues) do it. There are inevitably going to be many more permutations but professors who know their field and use qualitative grading frameworks know how to spot gems vs. bullshit; good answers vs. great ones; all possible combinations of answers. Therefore, professors should (and usually do) mark final exams in courses that are 120 students or less.

An Obvious but often Neglected Piece of Advice: Attend Classes.

There is often a temptation to become indolent and skip classes, assuming that the slides provided, or the readings will provide all that is needed. In my experience as a student and as a professor, I've found this is rarely the case. The classes provide real-time engagement and the slides are merely a useful foundation. The professors elaborate and explicate the nuances and emphasizes on the topics and ideas – and that is where learning happens. I've long studied impacts of class attendance in my courses and while I generally have very good attendance, I still have enough data from those who tend to miss my class (and, from talking with colleagues, all their other classes) to draw some conclusions. Examining the relative impact of attendance to classes (and tutorials in courses where that is relevant), the latest data indicate that attending > 90% of the classes (etc.) is rather important to success in courses I teach. The difference in grades on the exam indicate that there is a 36.5% difference (mean exam grade for those MIA is 51.8%; mean exam grade for those attending and [I add] participating or involved otherwise in classes is 88.3%). The overall course grade shows similar trends but a bit lower since one can do assignments solo; it is a 31.7% difference. If illness/mental health are issues, let us talk; we can make alternative arrangements for those sorts of deeper needs.

For those who have read this far: Who is this "Stephen David Murphy" anyway?

Diverting from music (I was once in love with my guitar; it didn't last due to religious differences), I earned a B.Sc. (Hons.) and a Ph.D. from Queen's University in Biology, specializing in plant ecology. I completed a post-doctoral fellowship at the University of Guelph in agriculture. I've been at UW in SERS since 1996, focusing on management, conservation, restoration and mitigation of invasive species in ecosystems. I am helping write 2 textbooks on restoration ecology. One of our best restoration ecologists, Richard Hobbs, has bestowed on me flattery - and I quote – when he said "You are a seriously deranged individual."[4]

In terms of restoration ecology, I have been both practitioner (consulting) and an academic. Since I first volunteered as a 14 year old with one of the 1st formal landscape-scale ecological restoration projects in 1979 (yes, 1979; *STFU*), I helped or led on over a thousand ecological restoration projects world-wide. This means a lot of field work and a lot of teamwork because I sure as hell didn't do a thousand plus projects all by my little 5'6" self.

I am a past-chair of the Board of the Ontario Chapter of the governing academic and practitioner organization, the Society for Ecological Restoration International (if you want opportunities beyond this course, SER Ontario and the local UW Chapter of SER recruits students for networking and educational purposes at a nicely reduced membership fee rate). I am the editor-in-chief of Restoration Ecology, and was co-chair of the 2013 25th Anniversary Conference of SER International at Madison WI. I am also Chair of the Centre for Applied Sciences in Ontario Protected Areas. Don't read this line because it is cursed by a one-eyed wizard named 'Poindexter'. *Just checking to see if you were reading this or not.* I was part of the advisory council to Parks Canada that revised the strategic planning and standard for ecological restoration. I also am on some teams at "rare" in Cambridge ON, a Reserve that represents one of the largest contiguous ecological restoration and conservation projects in an urban area. I sit on the Boards or advise another two dozen or so organizations that are involved in restoration from municipal to international scales. Essentially, I began to practice "restoration ecology" before it was really codified but I am only part of the 3rd or perhaps 4th "generation" of restoration ecologists who followed people like Aldo Leopold, Theodore (Ted) Sperry, John Curtis, Tony Bradshaw, Bill Jordan III, George Gann, Keith Winterhalder, John Reiger, Jack Ewel, Keith Bowers, Richard Hobbs, Eric Higgs, and Bob Dorney, among many others. I won't burden you with too many details on the history in the syllabus or in lessons; see www.ser.org for more on the history of Restoration Ecology.

---

[4] Yes, he meant this in jest, but you will find out why he said this soon enough – Bwa ha ha ha ha!! He also called me evil when we were in New Orleans at a conference in 2014. And he turned me into a newt! I got better…