Senior Sophistor Year

Capstone Research Project

&

Problems Assignment

2025-26

Structure of the year

	Semester 1	Semester 2
Activities	Capstone Research Project Problem-solving through self-directed learning.	Taught modules Problem-solving through self-directed learning and tutorials.
Assessments	Viva voce examination of: • capstone project • problem-solving of "seen" problems covering years 1-3 of moderatorship	Written examinations: • 6 papers for C • 5 papers for MC • 5 papers for CMM • 2 CH papers for nanoscience

Semester 1 will focus on self-directed learning (development of problem solving skills) and on research work towards completion of capstone project.

Activities in semester 1 will be assessed via viva voce examination during the TCD scheduled assessment week.

During semester 2 students will enrol in taught modules and will continue to develop problem-solving skills. Activities in semester 2 will be assessed via written examination during the TCD scheduled assessment week, apart from problem paper….

Structure of the year

(May be subject to change)

Module	ECTS	Cohort					Viva		Paper		
		C	MC	CMM	N	Bio	%	Sem.	%	Sem.	time (h)**
CHU44120	20	x					100	S1	-	-	-
CHU44720	20			x			100	S1	-	-	-
CHU44420	20		x				100	S1	-	-	-
CHU44520	20					x					
CHU44123	5	x	x	x		x	30	S1	70	S2	3
CHU44204	5	x	x	x		x	-	-	100	S2	1.5
CHU44004	5	x	x	x	x	x	-	-	100	S2	1.5
CHU44304	5	x	x	x	x	x	-	-	100	S2	1.5
CHU44205	10	x	x	x			-	-	100	S2	3
CHU44005	10	x		x	x		-	-	100	S2	3
CHU44167	10	x		x	x		-	-	100	S2	3
CHU44705	10	x		x	x		-	-	100	S2	3
CHU44405	10		x				-	-	100	S2	3
BIU33350	5				x				100	S1	1.5
BIU33250	5				x				100	S2	1.5
BIU44610	10				X				100	S2	3

Semester 1 – Important Dates
Capstone Research Project (20 credits) & Problem-Solving Module

Start of the Project: September 15th

Duration: 12 weeks

Safety workshop 16th of September

Electronic Submission of solutions to 6 Problems: 16.30 on November 21st 2025

Electronic Submission of Report: 16.30 on December 5th 2025

To create a fair evaluation method and to keep with college guidelines on plagiarism it has been decided to make use of the software embedded into blackboard during electronic report submission.

Electronic Submissions only!

Unauthorised late submissions will incur a 10% reduction in marks for the first 24 hour delay and a further 5% reduction per day thereafter

Check the college policy on the use of AI

Examination: The week of 15-19th of December 2025

Capstone Research Project – Structure of the Report

Discuss the structure and content of the report with your supervisor.

- The report must be typed with **font size 12**, **double line spaced,** and **not longer than 30 pages** in length.

- Your laboratory notebooks together with appendices of spectra *etc*. if appropriate must also be handed in at this time.

- It is crucial that you allow sufficient time for the completion of your report. NB. *Your supervisor must receive a draft copy of your report* ***allowing sufficient time for feedback/corrections****.*

Discuss the writing with him/her! Know what is expected of you…..

Project - Safety

- Standard safety regulations also apply to research laboratories: Lab-coats and safety glasses must be worn; eating and drinking is not allowed in the laboratories.
- Access to research labs will be revoked immediately if you are found to be in breach of safety guidelines!
- Project students should get a safety tour by supervisors; familiarise yourself with the locations of fire extinguishers, fire blankets, safety exits, showers
- Plan your experiments well in advance; familiarise yourself with risks associated with starting materials, products (SDS), instruments etc.
- Consult with supervisors/advisors to discuss safety aspects before starting the experiments
- Overnight experiments need to be signed off by your supervisor.
- College Emergency Number: Ext. 1999

Capstone Research Project – Structure of the Report

1. Introduction and Objectives of the Project: Identifies the scientific aims of the project and set this in context with other current and recent work

2. Results and Discussion: The experiments conducted, and results are set out and described. Results should be discussed and set in context with the recent literature so that their significance is evident. A clear story should be developed so that the reader is lead through the project, understanding why experiments were performed and the relevance of the results at each stage. The R&D section should lead on from the introduction, and into the conclusion, building on ideas from the introduction and clearly highlighting key results for the conclusion.

3. Experimental Sections/Materials and Methods: Experimental work should be described so that the experiments and results can be reproduced by other researchers. Appropriate characterisations and analyses need to be provided in order to provide evidence for the claims in the R&D section.

4. Conclusions and Future Work: The conclusions should be fully supported by the results. The conclusions should be discussed and set in the context of current and recent literature. The conclusions should be used to suggest a series of experiments highly likely to lead to further useful results which extend the current study into new and important areas.

5. References: related work and underlying concepts should be referenced; the references should obey the format of a recognised scientific journal (format of *Angewandte Chemie*, *J. Am. Chem. Soc.*, (ACS) *Chem. Commun*. (RSC)...

3. Experimental Sections/Materials and Methods:

This section is written in the 3rd person past passive voice and is a *concise summary* of what **you** did.

It should contain the *actual* procedure you carried out in the course of the experiment

It should include any modifications you had to make to the methods or reagents adopted elsewhere, s well as your observations, for example the solutions colours, the evolution of heat or gas, etc. It is never written as a series of numbered points. Reread your experimental think if you could repeat the experiment.

> e.g. A solution of $CrCl_3.6H_2O$ (10.0 g, 0.038 mol) in HCl (40ml, 5:3 *conc*.HCl:H_2O) was added to granulated zinc (10.0 g, 0.153 mol) under a nitrogen atmosphere and the solution was allowed to stand for 2 h until a pale blue colour was observed.
>
> Note – the formula or IUPAC name of each reagent is written out along with the number of grams and number of moles this corresponds to.

For more examples of this style look in any chemistry journal

IR spectroscopy

List the major peaks, labelling them as strong (s), medium (m) or weak (w). Assign any peaks which are important in identifying the product. Note: IR data are quoted to the nearest whole number.

e.g. IR (KBr disk) $\bar{\nu}$/cm^{-1} 3413 m (H_2O), 3000 m (CH_{Ph}), 2014 w (RuH), 1921 s (C≡O), 1305 s, 1153 m, 1078 s (CH def), 740 m.

UV-vis spectroscopy

The wavelength and usually the extinction coefficient must be listed for each peak in the spectrum (sh = shoulder). The extinction coefficient can be calculated using the Beer-Lambert law ($A = \varepsilon\ c\ l$). Some maxima are not automatically labelled by the machine. Since these usually turn out to be the most interesting ones, it is usually worth magnifying and labelling these absorptions.

e.g. UV-vis λ_{max} / nm (ε_{max} / dm^3 mol^{-1} cm^{-1}) 275 (30 000), 410 (850)

NMR Spectroscopy:

It is important to include:

- the nucleus (e.g. ^{1}H, ^{13}C, ^{31}P). Remember ^{13}C and $^{13}C\{^{1}H\}$ are not the same and you measure $^{13}C\{^{1}H\}$ routinely
- the frequency of the spectrometer (e.g. 250 MHz, 400 MHz)
- the solvent ($CDCl_3$, D_2O)
- the identity of the signal if it is known.

The order of the signals is from high to low field, (ie. from large to small ppm).

For proton spectra, the number of protons (the signal integration), the peak multiplicity, the coupling constant J in Hertz are also included.

Peak multiplicities are described as s = singlet, d = doublet, t = triplet, dd = doublet of doublets, dt = doublet of triplets, m = multiplet.

Remember that for proton signals the coupling constant is the interval between peaks multiplied by the frequency of the field in MHz.

e.g. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31-7.02 (45 H, m, H^{Ph}), -7.15 (H, dt, $J_{HP(trans)}$ 105.4 Hz, $J_{HP(cis)}$ 24.9 Hz, H^{H^-}).

or as a table:

δ (ppm)	multiplicity	integration	*J* (Hz)	signal
7.31-7.02	m	45 H		Phenyl Hs
-7.15	dt	1 H	105.4 *trans* 24.9 *cis*	hydride

3. Experimental Sections/Materials and Methods (in/organic):

N-[1-Methyl-pyprazino-ethyl]-4-nitro-1,8-naphthalimide, (8) Compound 8 was synthesised by reacting 1-(2-aminoethyl)-4-methylpiperazine (2.47 g, 2.58 mL, 17.2 mmol, 1.4 eq.) with 4-nitro-1,8-naphthalic anhydride (3.0 g, 12.3 mmol, 1 eq.) and Et_3N (2.5 g, 3.56 mL, 24.6 mmol, 2 eq.) in anhydrous toluene (200 ml), to yield the product as a brown solid (3.50 g, 77%) after a recrystallisation from MeOH. m.p. 109 - 111 ºC; HRMS: 369.1554 ($[M + H]^+$. $C_{19}H_{21}N_4O_4$ requires 369.1563); δ_H (400 MHz, $CDCl_3$), 8.85 (1H, d, *J* = 9.0 Hz, Ar-H7), 8.74 (1H, d, *J* = 7.5 Hz, Ar-H5), 8.70 (1H, d, *J* = 8.0 Hz, Ar-H2), 8.42 (1H, d, *J* = 8.0 Hz, Ar-H3), 8.00 (1H, t, *J* = 8.0 Hz, Ar-H6), 4.36 (2H, t, *J* = 7.0 Hz, $NCH_2CH_2N(CH_2CH_2)_2NCH_3$), 2.73 (2H, t, *J* = 7.0 Hz, $NCH_2CH_2N(CH_2CH_2)_2NCH_3$), 2.65(4H, s, $NCH_2CH_2N(CH_2CH_2)_2NCH_3$), 2.44 (4H, br. s, $NCH_2CH_2N(CH_2CH_2)_2NCH_3$), 2.28 (3H, s, $NCH_2CH_2N(CH_2CH_2)_2NCH_3$); δc (100 MHz, $CDCl_3$), 162.7, 161.9, 149.0, 131.8, 129.4, 129.2, 128.7, 128.5, 126.4,123.4, 123.1, 122.4, 54.9, 54.6, 52.7, 45.5, 45.5, 37.3; *m/z*: 369 $(M + H)^+$; v_{max} (neat sample)/cm^{-1} 3078, 2928, 2793, 2757, 1655, 1522,1339, 824, 761.

Hint and tips (a.k.a the voice of experience)

In the lab:

There is no such thing as a stupid question. Don't be afraid to ask for help.
Be organised, meticulous and tidy – there are no such things as short cuts
You have your spectroscopic data but look at it **now** not when you write up. Is it correct? Do you need to remove the last traces of toluene to get a nice spectrum? A printed spectrum is not an assigned spectrum so get the integrations, chemical shifts and assignments done straight away.
Don't be afraid to ask for help

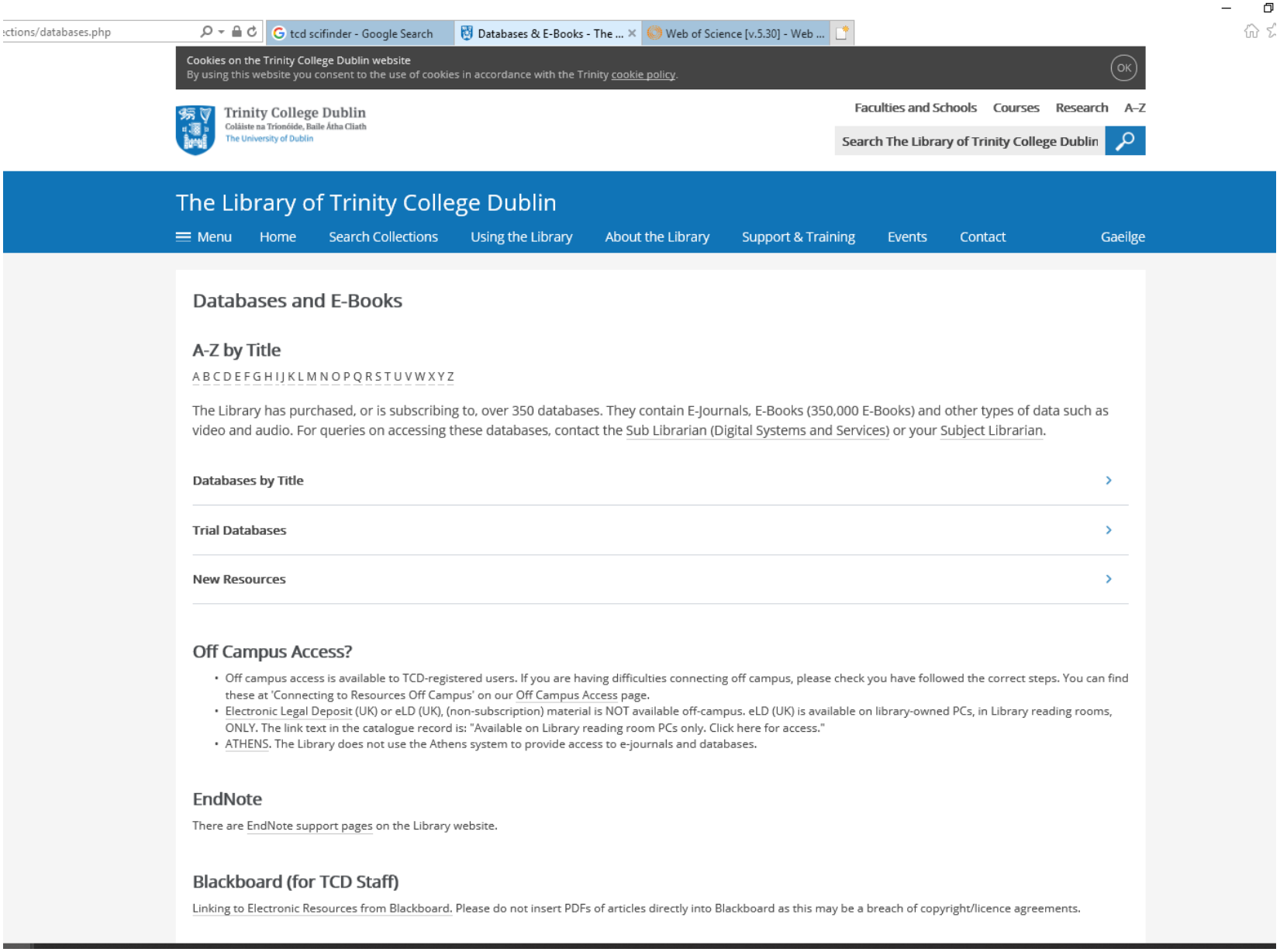
Literature searching:

Use some of the search engines and not just Wikipedia
Referencing your R&D section is easier as you go along
Care is needed when using citation managers (endnote) as it does not just work

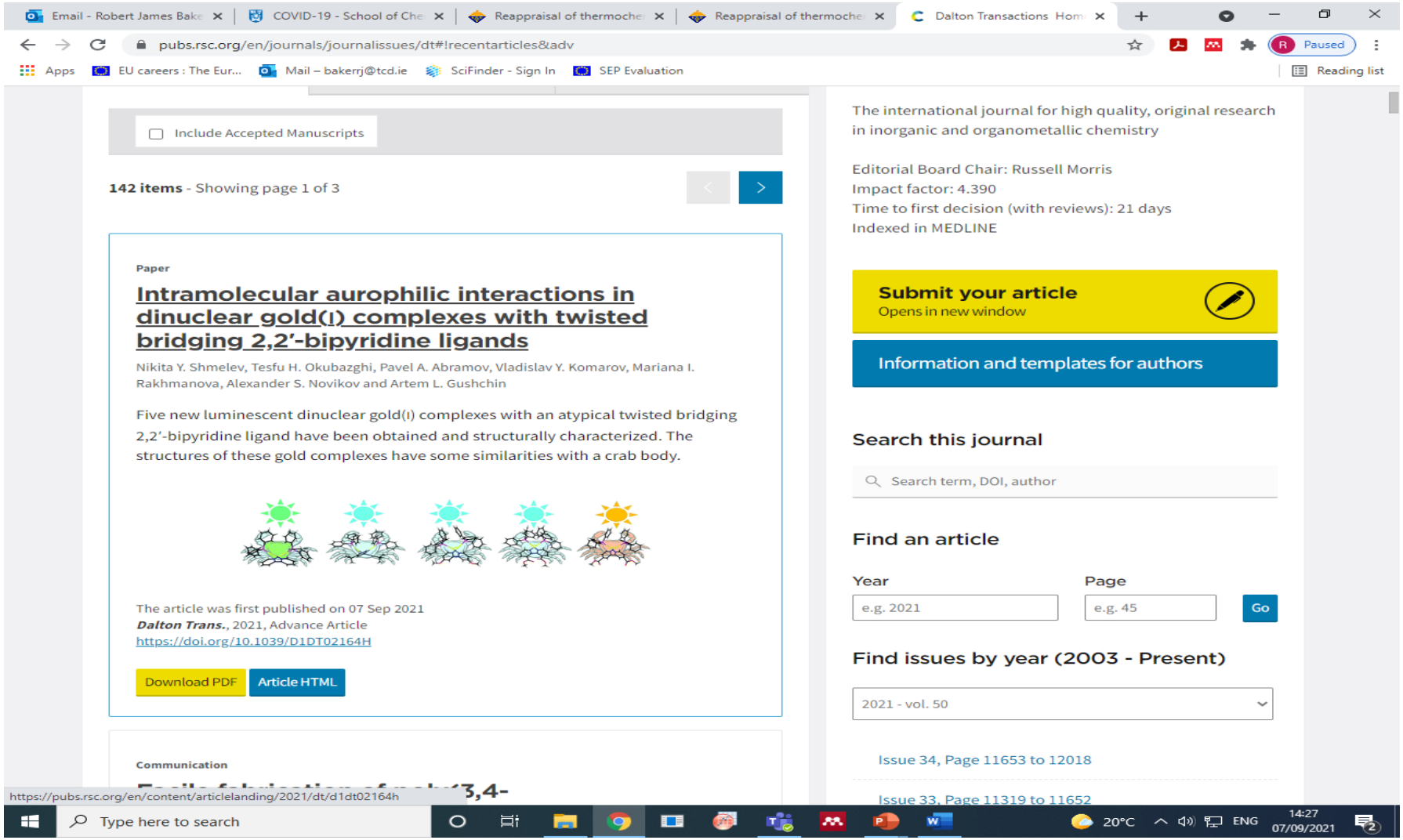
Writing up:

Everything takes π times longer than you expect; don't leave it until the last minute
Pay attention to your experimental section.
The intro, R&D and conclusions should tell a story; hold the reader's hand through your story!

Literature Searching



Literature Searching



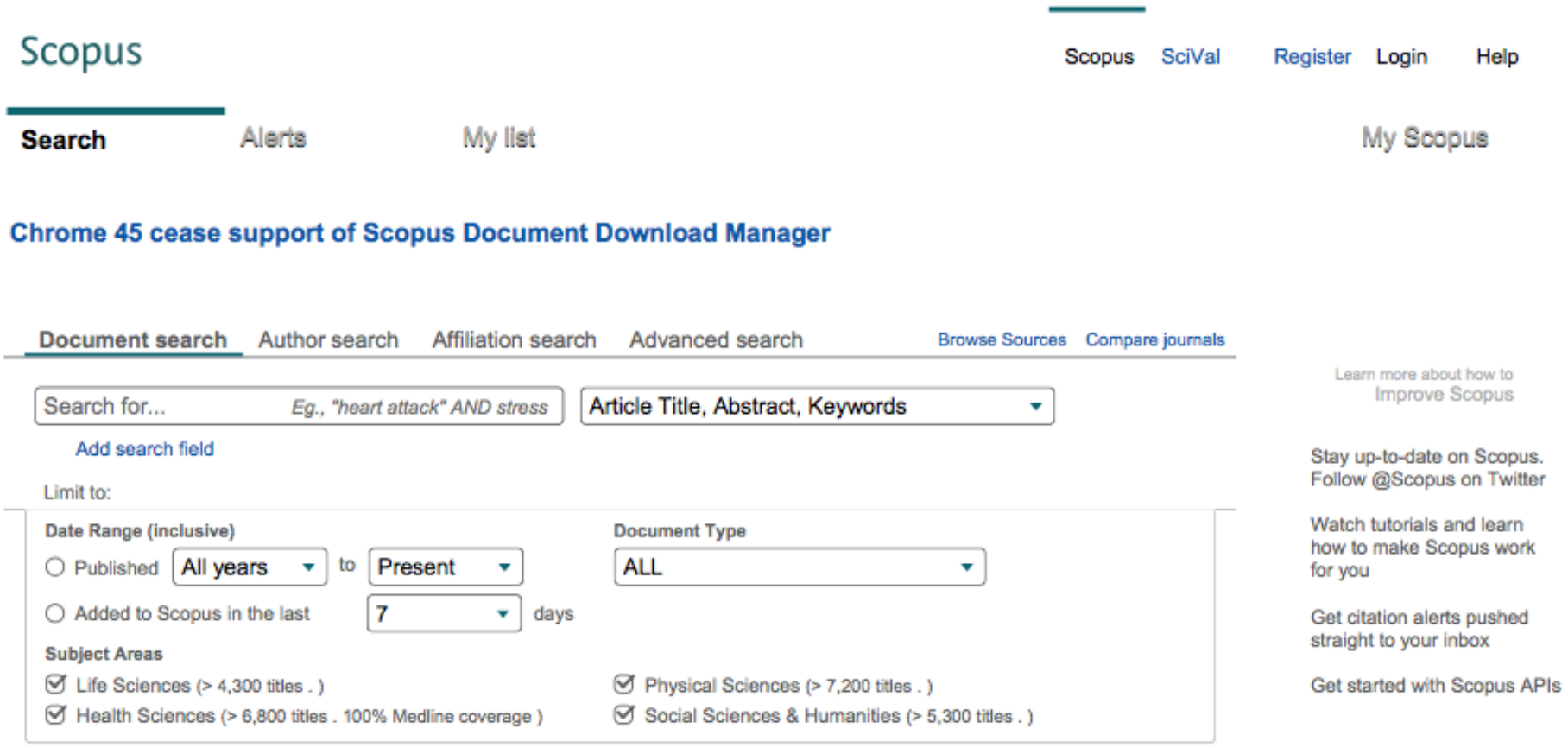
Online access at home:

take https://pubs.rsc.org/en/content/articlelanding/2021/dt/d1dt02164h

And modify the address to:

http://pubs.rsc.org.elib.tcd.ie/en/content/articlelanding/2021/dt/d1dt02164h

Literature Searching



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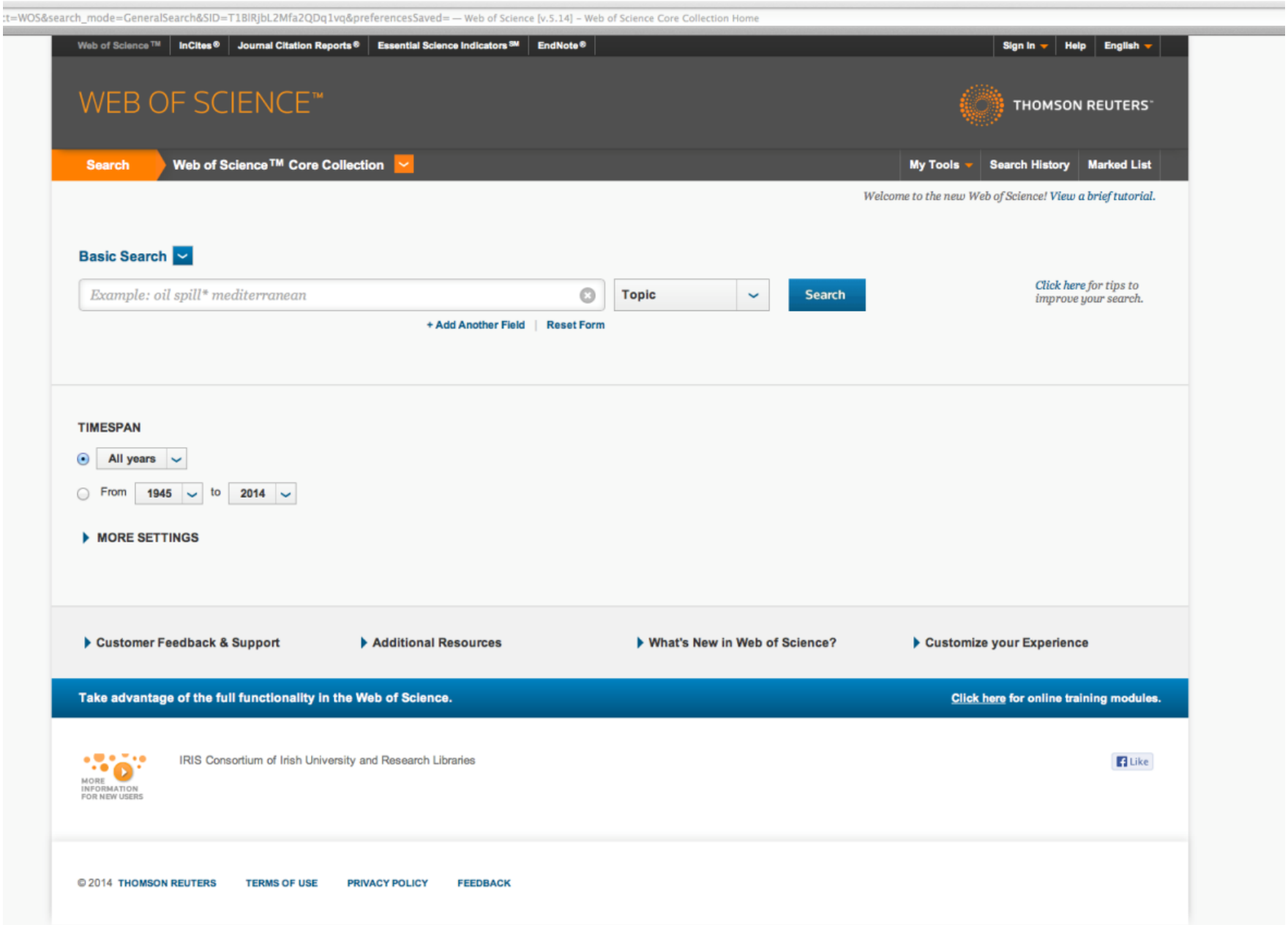

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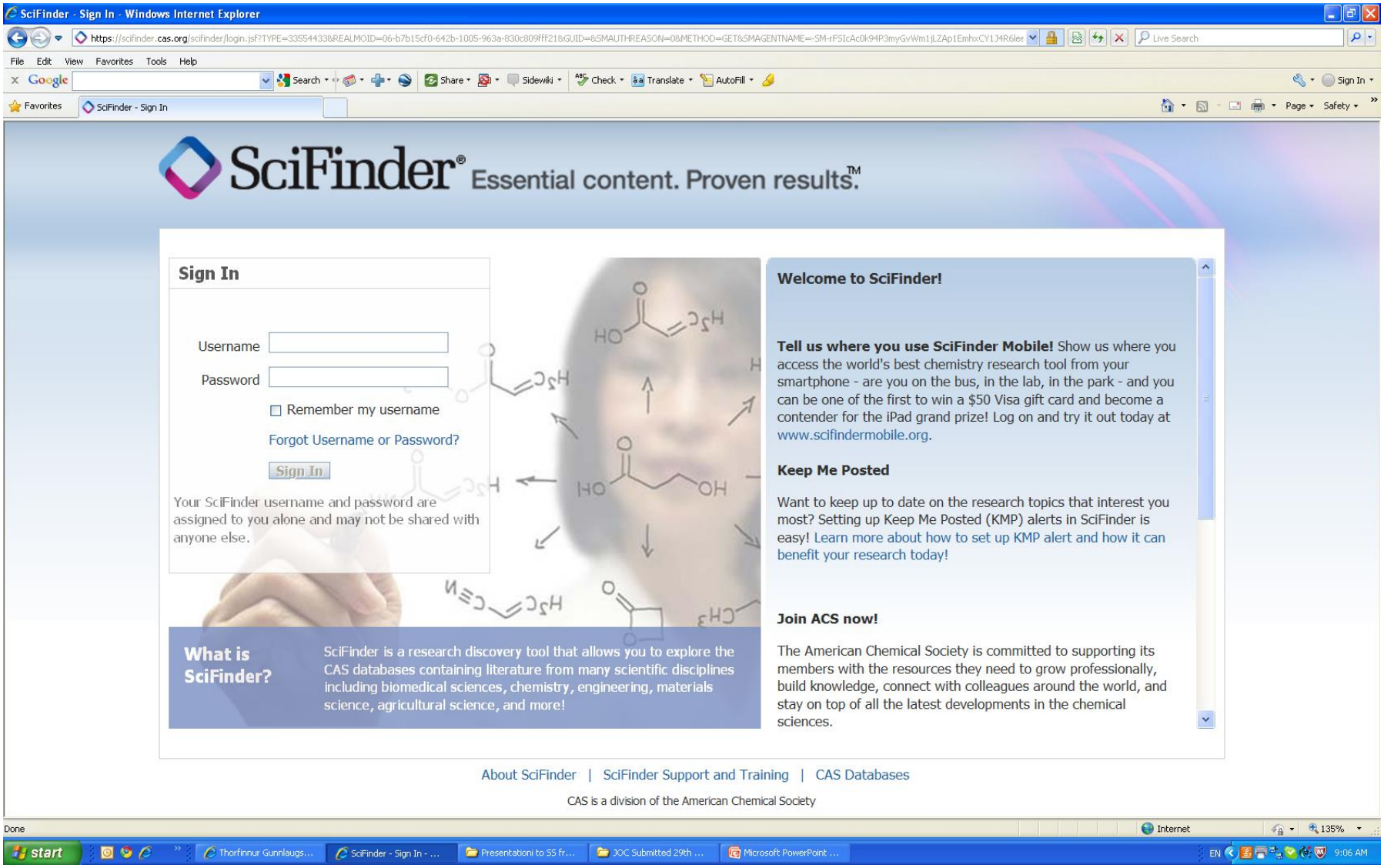

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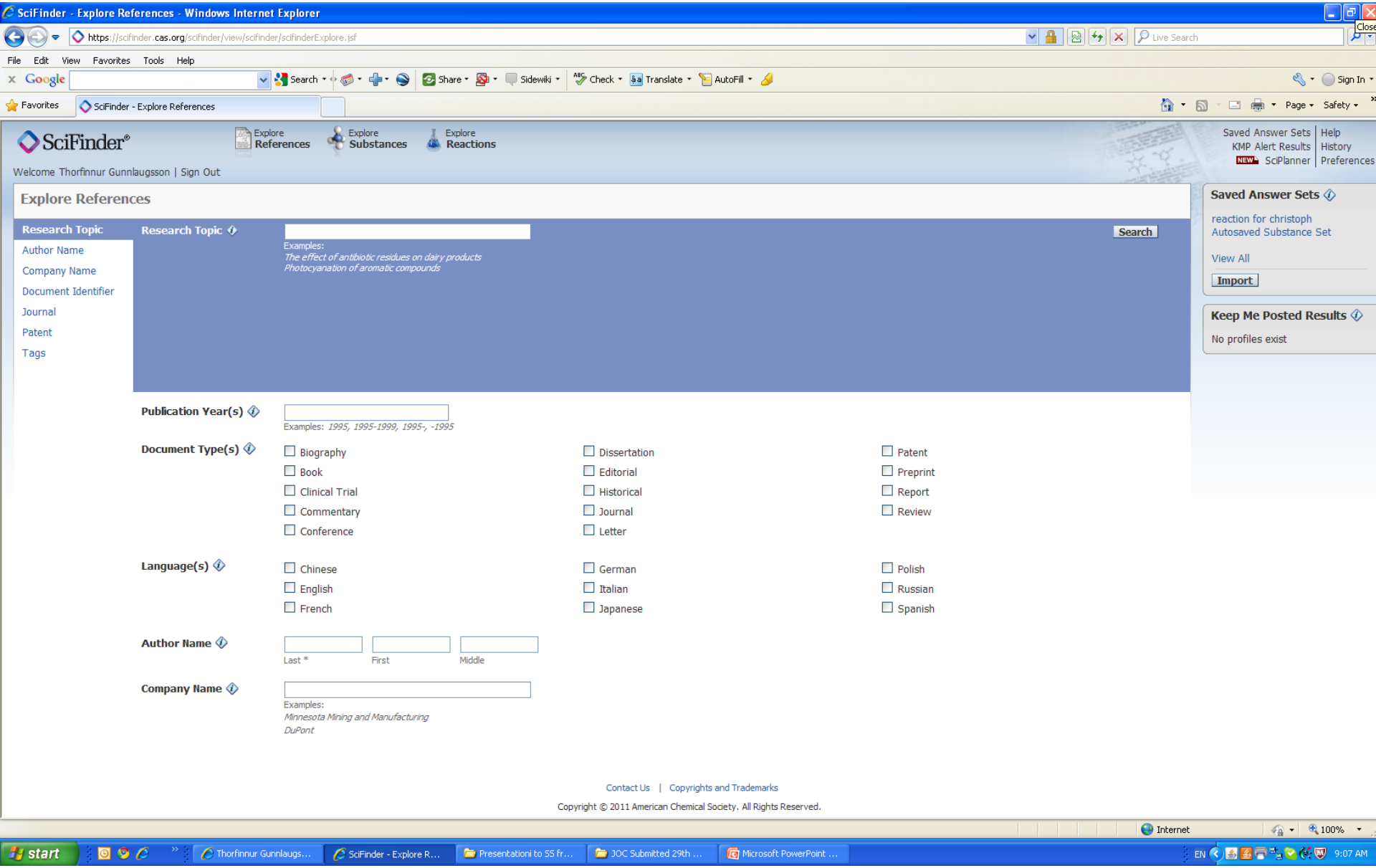

Capstone Research Project – Assessment

Project Assessment: Your project work will be assessed by:
three examiners:

Supervisor (20%): will submit a written report on the work conducted.

Two other assessors (40% ea.): will mark the project report and conduct a formal assessment involving a 10 min. presentation by the student followed by a 20min question & answer session in which the work and underlying theoretical concepts will be discussed. The problems will then be discussed.

Dates for presentations: Semester 1 (15th-19th December). These will be in person

Marks for your project will be allotted on the basis of quality of content, presentation, effort made, and performance during the oral examination….

SCHOOL OF CHEMISTRY, TCD
REPORT ON FINAL YEAR PROJECT
SENIOR SOPHISTER 2020-2021
SUPERVISOR'S FORM

Name of student:

Name of Supervisor:

Place where project was carried out:

Title of Thesis:

Comments on Practical Work

Diligence, motivation and organisation (including participation in group meetings and attendance at seminars) - *max 20*

Productivity and technical skills (effectiveness in implementing ideas and suggestions, and experimental competence/computational ability) - *max 20*

Academic contribution (initiative, independence, creativity and engagement and the extent to which the student was proactive in advancing the project) - *max 10*

Comments on Thesis Preparation Work:

Diligence, motivation and organisation (including preparing and submitting drafts for correction in advance and by suggested deadlines) - *max 20*

Productivity and skills (ability to generate draft documents and figures of good quality and effectiveness at implementing ideas and suggestions into the draft) - *max 20*

Academic contribution (initiative, independence, creativity and engagement and the extent to which the student was proactive in the drafting of the thesis) – *max 10*

(Please refer to the Guidelines and add comments to justify the mark given)

	Supervisor
Practical Work	
Diligence, motivation and organisation- *max 20*	
Productivity and technical skills - *max 20*	
Academic contribution - *max 10*	
Thesis Preparation Work	
Diligence, motivation and organisation - max 20	
Productivity and skills - max 20	
Academic contribution – max 10	
Final Mark (out of 100)	

Signature (Supervisor): _____Date: _____

SCHOOL OF CHEMISTRY, TCD
REPORT ON FINAL YEAR PROJECT
SENIOR SOPHISTER 2020-2021
EXAMINER FORM

Name of student:

Name of Examiner:

Place where project was carried out:

Title of Thesis:

Comments on Thesis:

Style, appearance, structure and English usage. Organisation of data/results - *max 15*

Clarity of introduction – originality and appropriateness of references and setting the project in context - *max 15*

Results and discussion - *max 25*

Conclusions, suggestions for future work - *max 5*

***Comments on presentation and Viva Voce examination* - max 40**

(Please refer to the Guidelines and add comments to justify the mark given)

	Examiner
The Thesis	
Style, appearance, structure and English usage. Organisation of data/results - *max 15*	
Clarity of introduction – originality and appropriateness of references and setting the project in context - *max 15*	
Results and discussion *max 25*	
Conclusions, suggestions for future work - *max 5*	
Presentation and Viva Voce examination	
Presentation of results, thesis defence and general knowledge - *max 40*	
Final Mark	

Signature (Examiner): ..... Date: .....

Problem Solving – Assignment

Module codes: CHU44123

Credit bearing: 10 ECTS (30% assessed in S1 viva assessment, 70% assessed in examination paper in S2*)

In semester 1, you will be given one assignment with a total of 6 problems covering years 1-3 of your moderatorship.

You will solve the problems in an independent manner; if you find errors in the questions then discuss this in your answer!

You are encouraged to consult textbooks and scientific literature to work on your solutions but are not allowed to copy solutions from fellow students.

After submission of your solutions you are free to discuss the problems with others in your SS class.

You must submit your solutions to all six problems via blackboard after study week, by **Friday November 21st**.

Problem Solving – Viva Voce Assessment

Viva voce examination for problem solving component will take place on the same day of your Research Project viva voce examination.

This section of the viva will be 10 min long and will take place after the discussion of the project is closed.

The assessors will select one of the 6 problems in the assignment and will ask the student to solve either the problem or a section of it during the examination (pen and paper or blackboard), and discuss/articulate the approach taken.

You might be asked to identify, discuss and/or correct any mistakes made in the submission.

SCHOOL OF CHEMISTRY

EXAMINER REPORT ON PROBLEM ASSIGNMENT
CHU44108/ CHU44408/ CHU44708 – SEMESTER 1

SENIOR SOPHISTER 2020-21

	Examiner
The written assignment	
Completeness and clarity of submission - *max 30*	
Problem solving at Viva Voce examination	
Correctness of solution of problem at viva - *max 40*	
Discussion of mistakes/foundation concepts underpinning the solution – *max 30*	
Final Mark	

Name of student:

Name of Examiner:

Written Assignment:

Problem No.	1	2	3	4	5	6	Total
Submitted Y/N							

Signature (Examiner): ..... **Date:** .....

Comment on whether the student made a fair attempt at all problems and on clarity of solutions - ***max 30 (100 words max)***

For this year 20/100

Discussion of problems at Viva:

The student was asked to solve problem No. ___ part ____ from the assignment.

Comment on whether the student correctly solved the problem, quality of his/her understanding of solution strategy. - ***max 40 (100 words max)***

For this year 50/100

Comment on whether the student corrected any mistakes and/or his/her understanding of foundation concepts underpinning the solution; in your comments please indicate areas for improvement identified at the viva that require revision - ***max 30 (100 words max)***

For this year 30/100

Moderatorship Examinations

The Final degree mark: 30% from JS Mark and 70% from the SS year.

Project mark + Problem Solving Mark in Semester 1 :	21.5 credits	≈ 35.83%
Examinations in Semester 2:	38.5 credits	≈ 64.17%

External examiners:

External examiners (for Chem, MedChems and CMMs) will visit for two days after semester 2 examinations (either in person or virtual). Dates to be confirmed

As a result of new calendar regulations, students will have the right to reassessment in their final year on all modules except the capstone project. Students who do not pass the sophister examinations will be able to repeat the year.

New for this year

Capping of reassessment grades

From this academic year, **ANY resit attempt will be capped at 40%.** The reason for this RSC Accreditation. Last year it was capped at 60% as in the past students have deliberately failed some modules in order to give themselves extra time to revise. This is unfair on students who revise for all modules. This was approved by the Senior Lecturer subject to the following conditions:

(i) to carry out a review of the performance of the derogation from an academic, logistic and student perspectives *after two years* so as to understand expected & unexpected consequences of the derogation. This means that any continuance of the derogation is contingent on the satisfactory performance of the derogation

(ii) that all affected students are fully informed of the change in (re)assessment (i.e. the derogation) at the beginning of term and the reasons for the change in (re)assessment rules derogation.

Summary of important dates

	TCD Project	Project Abroad
Start	15th September	15th September (approx.)
End Project work	~28th November	~28th November
Hand in Project Report	5th December	5th December
Supervisors Mark	Supervisor 20%	External Supervisor 20%
Presentation	15th-19th December	15th-19th December
Presentations / review	Examiners 80%	Examiners 80%

Taighde Éireann
Research Ireland

Key dates

Call open	11 September 2025
FAQ deadline	16:00 (Irish time) 16 October 2024
Applicant deadline	**16:00 (Irish time) 23 October 2024**
Supervisor /Mentor deadline	16:00 (Irish time) 6 November 2024
Research office endorsement deadline	16:00 (Irish time) 13 November 2024
Call outcome	End of April 2025

The programme will now be open to new entrants to a Master's or PhD programme **or** to registered students in the first year of the degree for which they are seeking funding, aligning with a full-degree funding model.

Academic Supervisors may act as **Primary** Supervisor for no more than one applicant to the programme. There is no restriction on the number of applications where a supervisor may serve as secondary or co-supervisor.

https://www.researchireland.ie/funding/government-ireland-postgraduate/

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For help with Mental Health problems use your tutor, student counselling, your GP….