

Laidlaw Undergraduate Leadership and Research Scholarships Academic-led Project Proposals 2027

This is a directory of all the academic-led, pre-defined research projects that are available for the Laidlaw Programme in 2027. For Academic Led projects you do not need to identify an academic supervisor as the academic listed on the project will be your supervisor. To be considered for these projects, you will need to meet with the faculty member listed about the project before submitting your application.

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Arts & Humanities	Classics and Ancient History
Business School	Accounting
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Arts & Humanities

Classics and Ancient History Project 1:

Project title	Classics education in Scotland: past, present and future
Academic Lead(s)	Arlene Holmes-Henderson
Faculty of Project	Arts and Humanities
Department of Project	Classics and Ancient History
Project description	This is an academic publishing scholarship opportunity. Together with a colleague at the University of Edinburgh, I am co-editing a book which brings together diverse perspectives on the learning and teaching of classical subjects in Scottish schools, universities and communities. The aim of the project is to publish a book with Edinburgh University Press which charts the history, records the present and fosters the future. The contract has already been received. The Laidlaw scholar will join the project at a crucial time when contributors are submitting redrafted chapters (based on editors' feedback) and we need to prepare the manuscript for submission to press. The scholar will liaise directly with authors, format text, prepare images and help draft the marketing questionnaire. They do not need knowledge of Classics, Scotland or education. This will be an excellent opportunity to develop a network of academics and teachers, to learn about the publishing process first-hand and to gain mentoring from experienced Humanities colleagues. The scholar will be thanked in the book's acknowledgements and will be invited to the book launch event.
Suggested output	3,000 to 5,000 word Report and an A1 Poster.

Essential Skills needed for Applicants	Good time management, excellent communication and attention to detail
Open to multiple scholars?	No. One scholar only

Classics and Ancient History Project 2:

Project title	Teaching Philosophy and Antiquity in Prisons
Academic Lead(s)	Arlene Holmes-Henderson
Faculty of Project	Arts and Humanities
Department of Project	Classics and Ancient History
Project description	This is an academic publishing scholarship opportunity. I am co-editing a book which brings together diverse perspectives on the learning and teaching of ancient philosophy and antiquity in prisons (worldwide). The aim of the project is to publish a book with the University of London Press which provides insights into innovative pedagogical practice and learner responses. The contract has already been received. The Laidlaw scholar will join the project at a crucial time when contributors are submitting redrafted chapters (based on editors' feedback) and we need to prepare the manuscript for submission to press. The scholar will liaise directly with authors, format text, prepare images and help draft the marketing questionnaire. They do not need knowledge of Classics, prisons or education. This will be an excellent opportunity to develop a network of academics and teachers, to learn about the publishing process first-hand and to gain mentoring from

	experienced Humanities colleagues. The scholar will be thanked in the book's acknowledgements and will be invited to the book launch event.
Suggested output	3,000 to 5,000 word Report and an A1 Poster
Essential Skills needed for Applicants	Attention to detail, excellent communication, good time management
Open to multiple scholars?	No. One Scholar only

Business School

Accounting:

Project title	From ESG Reporting to Business Value: How Can AI Help SMEs Turn Sustainability Information into Customer Engagement?
Academic Lead(s)	Mary Nanyondo
Faculty of Project	Business School
Department of Project	Accounting
Project description	Can better sustainability reporting actually help a small business attract customers? And can AI make this possible for Small and Medium-sized Enterprises (SMEs) without the resources of large corporations? Businesses are increasingly expected to demonstrate their environmental and social impact. While large organisations have developed sophisticated ESG (Environmental, Social and Governance) reporting systems, SMEs often face significant barriers, including limited time, expertise, data and financial resources. Artificial intelligence could change this by making sustainability information easier to collect, analyse and communicate. This project will explore how SMEs can move from simply reporting sustainability to using sustainability information to create meaningful business and customer value. The successful scholar will investigate how AI could support sustainability accounting and ESG reporting within SMEs and consider whether credible communication of sustainability performance could influence customer perceptions, engagement, purchasing behaviour or footfall.

	This project will offer considerable scope for the scholar to develop their own research proposal. Depending on their interests and methodological approach, the research could involve methods such as reviewing and analysing existing sustainability and ESG practices, SME case studies, interviews, surveys, analysing sustainability communications, or developing and evaluating AI-supported approaches to communicating sustainability information. Possible research questions include: What sustainability information matters most to SMEs and their customers? How might AI reduce the burden of measuring and reporting sustainability performance? What makes sustainability claims credible rather than perceived as “greenwashing”? And can sustainability information influence customers' decisions to engage with an SME? The project sits at the intersection of AI, accounting, sustainability, ESG reporting, entrepreneurship and consumer behaviour, providing an opportunity to undertake interdisciplinary research with practical relevance for SMEs.
Suggested output	3,000 to 5,000 word Report and an A1 Poster
Essential Skills needed for Applicants	Strong analytical and critical-thinking skills; ability to undertake independent literature and evidence-based research; and clear written communication.
Open to multiple scholars?	Two scholars: Project A: “Does Sustainability Pay? Evidence on ESG, Sustainability and Business Value for SMEs”, followed by Project B: “From ESG Evidence to Business Value: How Can AI Help SMEs Turn Sustainability Information into Customer Engagement?”

Science:

Computer Science Project 1:

Project title	Algorithm design for resource management in modern data center architectures
Academic Lead(s)	Dr Thirupathaiah Vasantam
Faculty of Project	Science
Department of Project	Computer Science
Project description	In modern computing systems, such as Microsoft Azure and Amazon AWS, often servers fail and are switched-off in order to reduce energy consumption and other operating costs. In such cases the jobs of inactive servers should be carefully transferred to active servers so that jobs are still processed fast enough in the system and operating costs are reduced. This is particularly useful when we use both renewable and non-renewable energy sources to operate data centers; we will try to move jobs from servers that use non-renewable energy to servers that use renewable energy. This will help in reducing carbon foot-print as well as water consumption, etc. In this project, we will design algorithms for clear job migration in distributed computer systems to balance both operating costs and system performance. We will design suitable load balancing algorithms and test their performance with the help of numerical results. This project will help reduce carbon foot-print and energy consumption in modern computing systems including systems that are used for AI applications.
Suggested output	3,000 to 5,000 word Report and an A1 Poster, with potential to write a conference paper based on the work
Essential Skills needed for Applicants	Strong background in Computer Networks and Systems, some knowledge of probability, and good problem-solving abilities and programming skills.
Open to multiple scholars?	Yes. Two Scholars can be accepted

Computer Science Project 2:

Project title	Machine-Learning Assisted Classification of Topological Chaos
Academic Lead(s)	Professor Christopher Marcotte
Faculty of Project	Science
Department of Project	Computer Science
Project description	The contraction of the heart muscle is driven by a periodic electrical signal which propagates across the tissue. In the normal rhythm, these signals are isolated coherent waves that propagate more or less uniformly. If this normal rhythm is disrupted, then a heart may enter tachycardia whereby the isolated coherent wave is broken and begins to rotate around itself like a spiral. Tachycardia is typically not fatal on it's own, but the spiral rotation happens at a rate much higher than the normal rhythm, and this destabilises the spiral and leads to the breakup of the spiral into many, small, interacting wavelets. This state of chaotic wavelet dynamics is thought to underly fibrillation, and understanding how these wavelets interact through their essential features (e.g. their orientation and position) is the central topic of this research project. We will work on developing a software, which uses as part of it's construction a machine learning model, which tracks the dynamics of these objects over time and in particular, develops a model of how these features interact.
Suggested output	3,000 to 5,000 word Report and an A1 Poster, with a git repository containing the students' efforts toward developing the software and ML model.
Essential Skills needed for Applicants	Students must be: - interested in numerical computing, - have some foundational understanding of machine learning
Open to multiple scholars?	Yes. Two Scholars can be accepted

Computer Science Project 3:

Project title	Tunable Fidelity Probabilistic Root-Finding of Noisy, Expensive, Functions
Academic Lead(s)	Professor Christopher Marcotte
Faculty of Project	Science
Department of Project	Computer Science
Project description	In classical scientific computing, we begin with an interval containing a sign-change of an objective function with importance for our application area. We bisect the interval by sampling, and discard the half-interval which no longer contains a sign change. This process repeats until the sign change location is determined to a user-specified tolerance, or our computational resources are exhausted. This is the bisection method, and it provably converges to the sign-change in exact or finite arithmetic, and performs reliably (if slowly!) in practical problems. When our objective function is not perfectly deterministic -- that is, when we can only evaluate it probabilistically due to error, noise, or cost -- we rely to the probabilistic bisection method. This treats the location of the sign change as a distribution over the interval, and samples of the noisy objective function sequentially changes our likelihood of the location of the sign change. In classical analyses of the method, the cost of the function is constant and so is the variance of the noise of the output. In this project we will consider functions which have tunable fidelity -- like solvers for ordinary differential equations -- and investigate methods for tuning root-finding to exploit this property. Scholars will work to understand the probabilistic bisection method and investigate several research questions relating to it: 1. Can tunable fidelity be useful for determining the root of the highest-fidelity form of the function?

	2. Can heuristic strategies be developed to exploit this tunable fidelity to accelerate the determination of the root? 3. Can we determine appropriate bounds for the convergence of these methods? 4. Can we prove that the method remains guaranteed to converge when the fidelity is variable? Scholars should consider an appropriate application domain to highlight their own interests.
Suggested output	The Laidlaw scholar should anticipate putting their work into their own private git repository, which they may make public at the close of the project.
Essential Skills needed for Applicants	The scholar should have: 1. A curiosity regarding approximation and surrogate models 2. Some familiarity with numerical computing (e.g., the idea of tolerances in a numerical solver) 3. The ability to express their thinking clearly.
Open to multiple scholars?	The project can support up to two scholars provided sufficiently distinct focuses.

Computer Science Project 4:

Project title	Adapting Classical Scientific Computing Methods to be Energy-Aware
Academic Lead(s)	Professor Christopher Marcotte
Faculty of Project	Science
Department of Project	Computer Science
Project description	Classical scientific computing focused almost exclusively on the scaling of workloads across computational resources i.e. high-performance computing (HPC). In the modern era, we are more concerned regarding the energetic impact of our computational

	workloads and the efficiency of our codes. Driven somewhat by this awareness, multi-precision methods and asynchronous computing have driven us to engage with low-power computing (LPC). This motivation is sometimes put blithely: "your phone is more powerful than the computer which took [humanity] to the moon". Adapting our existing scientific computing methods for the modern age requires a reconsideration of priorities; we will identify promising algorithms from scientific computing and adapt them for modern low-power hardware, and monitor and characterise their performance in terms of relevant quantities (e.g. energy, power, runtime). This may include asynchronous methods, modern concurrency models, low-level reimplementations, or investigating the utility of modern programming languages to exploit their features. Scholars will work to identify and understand a relevant algorithm and attempt to answer research questions like: 1. What features of classical scientific computing algorithms makes them amenable to reconsideration in terms of their energy use? 2. What features of modern hardware affect the performance and energetics of the computation? 3. To what degree can energy usage be forecasted, and can that be used to guide execution in constrained environments? A typical example in this domain is the Ozaki schemes for high-precision outputs through emulation with low-precision calculations, and in particular, the application to DGEMM.
Suggested output	Student should develop their work in their own private git repository which they may choose to make public on completion of the project.
Essential Skills needed for Applicants	The ideal candidate will have some interest in numerical computing, some skill with mathematical reasoning, and the ability to explain their thinking clearly.

Open to multiple scholars?	At least one, and likely two if sufficiently distinct algorithms are considered.
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Physics Project:

Project title	Using augmented reality to demystify astronomical instrumentation
Academic Lead(s)	Dr Robert Harris
Faculty of Project	Science
Department of Project	Physics
Project description	Augmented reality can help people understand how complex optical systems work (e.g. https://www.durham.ac.uk/research/institutes-and-centres/physics-education/services/augmented-reality/). What could you do to demystify the most complex optical systems in the world?
Suggested output	3,000 - 5,000 word Paper and A1 Poster, plus an augmented reality optical bench design for a local experiment.
Essential Skills needed for Applicants	Applicants need to be comfortable with programming skills. Platforms such as Meta Quest 3 or HoloLens may be used. Unity experience or willingness to learn is an advantage.
Further details	This project aims to demystify how large scale astronomical instrumentation works using Augmented Reality (AR). Astronomical instruments can have over 50 optical elements, focussing, collimating and shaping light from the telescope This project will build on existing AR tools to develop a tool to visualise the light path through an optical test bed in the Physics Department

Open to multiple scholars?	Yes. 1 to 3 scholars
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Psychology Project 1:

Project title	Creative Thinking Under Constraint: How Childhood Environments Shape Creativity and Problem-Solving
Academic Lead(s)	Professor Bruce Rawlings
Faculty of Project	Faculty of Science
Department of Project	Psychology
Project description	Why might two children approach the same problem in completely different ways? One possibility is that the environments in which children grow up shape not only what they know, but also how they learn to generate and evaluate solutions. Most developmental research on childhood disadvantage has understandably focused on negative outcomes. However, emerging theories suggest a more complicated picture. The Hidden Talents Framework proposes that children growing up in challenging, unpredictable, or resource-limited environments may develop particular cognitive strategies that are useful for navigating those environments. Creativity and flexible problem-solving are intriguing possibilities, but they have received surprisingly little attention. This project will provide the first stage of a new research programme examining how children's everyday environments relate to creative cognition. The Laidlaw Scholar will work with the supervisor to investigate children aged approximately 7–12. Children will complete a set of engaging tasks assessing different aspects of creativity, including

	generating original ideas, identifying solutions, and solving practical problems when resources are constrained. Caregivers will complete questionnaires about children's developmental environments. A particularly important question will be whether children's abilities look different depending on how we test them. Conventional creativity tasks are often relatively abstract. Skills developed through everyday problem-solving might instead become most visible when children encounter realistic constraints or practical problems. The Scholar will gain experience across the research process, including reviewing literature, working with children and families, collecting and managing behavioural data, scoring psychological measures, statistical analysis, and communicating findings. They will also have scope to refine the precise hypotheses and analyses according to their interests. The project sits at the intersection of developmental psychology, creativity, resilience, education, and socioeconomic inequality, and will contribute pilot evidence for a larger programme investigating how developmental science recognises children's strengths as well as their difficulties.
Suggested output	A research report of up to 3,000 words and an A1 academic poster. In addition, the Scholar will produce a cleaned and documented research dataset, reproducible analysis code, and a brief methodological summary identifying recommendations for a subsequent larger-scale study.
Essential Skills needed for Applicants	Strong interpersonal and communication skills, including confidence interacting professionally with children and families. Excellent organisation and attention to detail, particularly for behavioural data collection, scoring, and data management. Intellectual curiosity and ability to work independently, including willingness to engage critically with psychological research and learn new research methods.

Open to multiple scholars?	Yes. This project can accomodate two students.
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Psychology Project 2:

Project title	Episodic memory and navigation in the real world
Academic Lead(s)	Professor Alexander Easton
Faculty of Project	Faculty of Science
Department of Project	Psychology
Project description	Much of what we know about the psychology of navigation and episodic memory comes from careful lab based experiments, but doesn't capture critical elements of memory in the real world. In particular the interaction between episodic memory and navigation is poorly understood and is critical to support navigation and memory across healthy and ageing populations. Durham offers an opportunity to explore this in some detail, given the complex network of paths and roads one can navigate along, as well as the easy ability for some prominent landmarks (e.g. the cathedral) to be easily hidden whilst walking some of these routes. To this end the project should look to take theoretical ideas from lab based experiments and use these to map routes around Durham and its local area that will allow the testing of these theoretical concepts. These will also be piloted with participants and explored for both quantitative and qualitative measures.
Suggested output	To be discussed during supervisory meetings.

Essential Skills needed for Applicants	Knowledge of literature around psychology of memory and navigation. Quantitative analysis Qualitative analysis
Open to multiple scholars?	Yes. This project can support 2 students.

Psychology Project 3:

Project title	The effects of e-cigarette use during pregnancy on fetal behaviour: a comparison to a control group
Academic Lead(s)	Professor Nadja Reissland
Faculty of Project	Faculty of Science
Department of Project	Department of Psychology
Project description	The NHS advocates for women who smoke cigarettes during pregnancy to change to e-cigarettes. These women are then classified as “non-smokers”. Given that nicotine in e-cigarettes changes brain structures the question we investigate is whether fetuses exposed to nicotine react differently to sound and light stimulation compared to fetuses not exposed to nicotine. Students, as part of the programme, learn a dedicated coding system for fetal movements and work from ultrasound videos collected for a PhD on the effects of nicotine on fetal and neonatal cognitive development. References: Ayesha Rahman Ahmed. A Review of Electronic Cigarettes and Liquid Nicotine Poisoning Exposure Cases in the United States. J Pharm Pharm Sci (www.cspsCanada.org) 25, 354 -368, 2022

	https://www.frontierspartnerships.org/journals/journal-of-pharmacy-pharmaceutical-sciences/articles/10.18433/jpps33141/pdf Gambadauro, A., Galletta, F., Andrenacci, B., Foti Randazzese, S., Patria, M. F., & Manti, S. (2025). Impact of E-cigarettes on fetal and neonatal lung development: the influence of oxidative stress and inflammation. <i>Antioxidants</i>, 14(3), 262. Walayat A, Li Y, Zhang Y, et al. Fetal e-cigarette exposure programs a neonatal brain hypoxic-ischemic sensitive phenotype via altering DNA methylation patterns and autophagy signaling pathway. <i>Am J Physiol Regul Integr Comp Physiol</i> 321: R791-R801, 2021. doi: 10.1152/ajpregu.00207.2021.
Suggested output	A research report and research poster.
Essential Skills needed for Applicants	The student would need to be 1. Reliable, with 2.Attention to detail and systematic observational coding and 3. is able to use statistics and clearly communicate results.
Open to multiple scholars?	Two students could work on this project: one investigating fetal eye movements and the other fetal mouth movements. 1. Does e-cigarette nicotine exposure influence fetal eye movements (assessing cognitive development) in the womb 2. Can fetuses demonstrate mouth movements to imitate specific stimuli they see and hear in the womb: an investigation into the cognitive effects of nicotine.

Psychology Project 4:

Project title	Closing the Information Gap: Individual Differences in Curiosity-Driven Learning
Academic Lead(s)	Dr Jacky Chan
Faculty of Project	Faculty of Science
Department of Project	Department of Psychology
Project description	Curiosity is an important driver of learning, with epistemic curiosity arising when learners perceive a gap between what they know and what they want to know (Loewenstein, 1994). Studies using trivia-based learning paradigms have shown that higher epistemic curiosity is associated with better memory for trivia answers and greater motivation to seek further information (e.g., Fastrich et al., 2018). More recent findings suggest that curiosity-driven learning may vary across neurodevelopmental characteristics. For example, higher autistic traits have been shown to be associated with more persistent and effective exploration (Poli et al., 2024), while higher hyperactive-impulsive ADHD traits have been shown to be associated with greater trait curiosity (not specific to acquiring knowledge or resolving uncertainty), independently of inattention (Le Cunff et al., 2026). However, little is known about how autistic and ADHD traits relate to subject-specific interest and epistemic curiosity, and whether and how these individual differences shape curiosity-driven learning. This project will investigate individual differences in curiosity-driven learning among university students, using a dimensional approach to autistic and ADHD traits across the general student population. Participants will complete measures of trait epistemic curiosity, subject-specific interest, and autistic and ADHD traits. They will also complete a trivia-based learning task, where they generate answers, report their confidence and state epistemic curiosity, receive the correct answers and explanations, and report willingness to seek further information after being shown the correct answers. An unexpected recall test following a delay will assess learning. More specifically, the project address the following research questions:

	1. How do trait epistemic curiosity and subject-specific interest relate to state epistemic curiosity and learning? 2. How do autistic and ADHD traits relate to epistemic curiosity, information seeking, and learning? 3. Does the relationship between state epistemic curiosity and learning vary as a function of autistic and ADHD traits?
Suggested output	The project could potentially lead to a publication in an academic journal and presentations at academic conferences.
Essential Skills needed for Applicants	Effective communication skills; Excellent organisational skills; Good understanding of both quantitative research methods
Open to multiple scholars?	Yes (up to 2)

Biosciences:

Project title	Energy-guided design of multi-target sensory domains for crop protection
Academic Lead(s)	Professor Adam Bentham
Faculty of Project	Faculty of Science
Department of Project	Department of Biosciences

Project description	Crop disease is a major constraint on global food production. Pathogens infect plants by secreting effector proteins into host cells. Many of these belong to families whose members share almost the same three-dimensional shape while differing greatly in sequence, which allows the pathogen to escape recognition by plant immune receptors. Resistance engineered against one effector is therefore often short-lived. This project asks whether a physical property of proteins called energetic frustration can be used to get around this problem. Frustration describes regions of a protein surface where the local packing is suboptimal. Such regions are often functionally important and appear to be conserved across effector families even when sequence is not. If so, they may represent a shared weak point that a single designed protein could recognise across many family members. The scholar will work computationally. You will build a structural dataset for one effector family, map frustration across its members using published analysis tools, and identify surface patches that are conserved across the family. You will then use BindCraft2, a recently released AI protein design platform with multi-target optimisation, to design candidate binding proteins against those patches and compare them with designs made without frustration guidance. Promising candidates will be shortlisted for experimental testing in the lab beyond the summer period. You will be trained in structural bioinformatics, protein structure prediction, use of a high-performance computing cluster, and current AI-based protein design methods, and you will join group meetings in the Bentham Lab and the Centre for Programmable Biological Matter. No prior protein design experience is required, but some comfort with computers and a willingness to learn scripting is essential.
Suggested output	The scholar will produce a documented and reproducible analysis workflow, deposited in the lab's code repository, together with a shortlist of designed candidate binders and their evaluation metrics for follow-up experimental work. No confidentiality restrictions are anticipated, though final design sequences may be embargoed pending publication.

Essential Skills needed for Applicants	1. Foundational understanding of protein structure and function, from at least one biochemistry, structural biology or molecular biology module. 2. Ability to work independently, keep clear and reproducible records, and communicate progress at weekly meetings. 3. Basic competence with the Linux command line and a willingness to write or adapt simple Python scripts.
Open to multiple scholars?	Yes. 2 students can be accomodated on this project.

School and Social Sciences and Health

Government and International Affairs:

Project title	Futurology and Peace: What can futurologists tell us about what peace might look like in the far future
Academic Lead(s)	Professor Roger Mac Ginty
Faculty of Project	Social Sciences and Health
Department of Project	School of Government and International Affairs
Project description	Policy timelines in relation to peace and security are often 3 to 5 years at most. There is little room for strategic thinking. This comes at a time when the international peace architecture is fragmenting and there is a dire need for strategic thinking beyond short timelines. The proposed research is essentially to conduct a literature review that would bring two sets of literature together: futurology and peace. The task would be to examine the works of some of the world's leading futurologists and see what they have to say about peace. Futurologists have much to say about technology, social relations, business dynamics, and how humanity might face shared challenges (such as climate change). The task would be to look beyond relatively short timeframes and instead extract what futurologists have to say about society in 30 or 50 years time. Applicants would draw up a matrix of peace-related factors in conjunction with the supervisor (e.g. social relations within states; extent to which basic needs are covered; rights to assemble and protest etc) and then would go through the literature and identify what futurologists have said about these factors. It is clear that conventional thinking about peace and conflict is "stuck" between a nostalgia for a supposed golden age of the past and the current obsession with security. The idea behind the proposed research is to leapfrog current short-term thinking and to produce some genuinely horizon-scanning work.

Suggested output	3,000 - 5,000 word Paper and A1 Poster
Essential Skills needed for Applicants	Close reading of texts Ability to synthesise and identify key elements Ability to communicate on paper with clarity
Open to multiple scholars?	No. One scholar only