

Sample Budget Justification

Senior Personnel (Years 1-5)

PI NAME, Ph.D. Principal Investigator

PI **LAST NAME**' s background is in **XXXX**. Her/His research focus is on **XXXX**. S/He will be primarily responsible for **XXXX**. S/He will devote **XX** months of her/his time during the summer and **XX** months of her/his time during the academic year to this project. S/He will also closely supervise the graduate students on all aspects of their work for the entire duration of the project. A month is calculated as one-ninth of the annual salary base rate.

Other Personnel

(TBD) Postdoctoral Research Associate (Years 1-5)

A highly motivated and prepared postdoctoral researcher will be recruited to carry out the **gene-environment interaction experiments involving neurodegeneration after genotoxin exposure in the context of gene knock-down or knockout**. The postdoctoral research associate will devote 12 months effort per year to this project, and may be replaced as necessary.

(TBD) Other Professional - Sr. Programmer/System Architect (Years 1-5)

A portion of the funds will be used to support advanced development staff who will contribute substantially **by**. A **Sr. Programmer/System Architect** is budgeted for **0.4** FTE. The annual salary for this position is set by the University based on industry norm, years of experience, field of expertise and activities performed.

(TBD) Graduate Students (Years 1-5)

Duke University Ph.D. student wages are determined by the Graduate School in consultation with the faculty, department heads, deans, and the University administration, based on consideration of living costs and the competitive market for top-quality Ph.D. students. **Two** Computer Science graduate students will work on this project **full-time** during the academic year and **66.67%** during the summer in Years **1-5**. The students will be fully involved in both theoretical and implementation aspects of the proposed research. Full-time graduate student effort during the academic year is capped at 19.90 hours per week, and during the summer at 39.90 hours per week.

(TBD) Undergraduate Students (Years 1-5)

Funds have been budgeted for **a part-time** undergraduate student (approximately 10 hours per week at \$12/hour during the academic semesters, plus 20-25 hours/week during the summers). The rate is based on the current salary of a qualified undergraduate, as well as other on-campus rates for undergraduate programmer positions.

Standard cost-of-living increases of 3% are budgeted in the out years for all personnel.

Fringe Benefits (Years **1-5**)

Fringe benefits will be applied at the negotiated Federal rates.

Other Direct Costs

- **Equipment** (Year 1)

The equipment budget includes two Dell PCs with the following specifications: Xeon processor 5120, 4MB Cache, 18.6GHZ, 1066MHz FSB, 4GB RAM, nVidia FX4600 GPU, along with two storage arrays with a total of 6TB storage. The machines will be placed in the applied geometry lab of the Department of Computer Science. They will be used as a cluster, along with two other existing machines, and they will be used for the computer simulation described in the proposed research.

- **Travel - Domestic and Foreign** (Years 1-5)

Travel has been budgeted for the PI, Postdoc, and/ or graduate students to attend relevant meetings and scientific conferences at which ideas and information are exchanged with colleagues, to submit papers for presentation, to work directly with research collaborators, and to conduct educational business relating to this research effort. Conferences may include XXXX, XXXX, and/ or XXXX. We also include support for travel to project meetings. Travel to the conference will be determined by an assessment of the most likely opportunities for collaborations with various researchers on topics relevant to this project. It is also anticipated that these are the conferences to which papers resulting from the research done through this project will be submitted for presentation. Trips are projected to last three to five days. We estimate that domestic trips will cost approximately \$1,800 each and international trips will cost approximately \$3,000 each. These estimates include ground and air travel, lodging, subsistence, and registration expenses.

- **Materials and Supplies** (Years 1-5)

Funds have been budgeted for approximately \$11,000 in experimental lab supplies in Years 1-3. A major cost is oligonucleotide (oligo) synthesis and purification. DNA synthesis costs approximately \$1/base for the scale required, therefore the oligos for a single tile cost approximately \$250 - \$300, testing a variant of an oligo costs range from \$50 - \$90 depending on the length. Modified DNA (-amino,-thiol, -fluorescent label) costs an additional \$40 - \$60 per oligo.

Other budgeted supplies include restriction enzymes and other reagents, including radioactive labels, typical cost \$80 - \$100 per tube; membrane filters; organic chemicals and biochemical; AFM tips, typical cost \$10 - \$40 each and one experiment typically consumes 3 - 10 tips; Eppendorf tubes; glassware; disposable pipets; acrylamide and bisacrylamide; tris and urea; electrophoretic plates and chambers; and electroelution membranes.

- **SMIF and LMCF** (Years 1-5)

The Shared Materials Instrumentation Facility (SMIF) at Duke University operates as an interdisciplinary shared use facility with a full-time director and technical engineer. The SMIF was established in 2002 as part of Duke University's Materials Initiative with funding from the Duke University Provost's office. The SMIF is available for use by Duke University researchers from the various schools and departments as well by external users from other universities, government laboratories, or industry. The facility enables shared access to a fabrication laboratory (plasma asher, photoresist coater, ion etch, acid etch, spin coater, etc.) and to the following instrumentation equipment:

1. Atomic Force Microscope (Digital Instruments Dimension 3100).
2. Scanning Electron Microscope (FEI XL30 SEM-FEG).
3. Hall Effect Measurement Station.
4. Probe Station (Signatone S-1160A-5).

5. Transmission Electron Microscope (Hitachi HF-2000).
6. X-Ray Diffractometer (Philips X'Pert PRO MRD HR).
7. X-Ray Photoelectron Spectrometer (Kratos Analytical Axis Ultra).

Hourly-based user fees are charged as a means of recovering the direct costs associated with operating the facility. Funds have been budgeted for 100 hours use in Years 1-5.

The Light Microscopy Core Facility (LMCF) at Duke University also operates as an interdisciplinary shared use facility and provides many types of Light Microscopy instrumentation billed at various use rates. Funds have been budgeted for 100 hours use in Years 1-5.

- **Publication Costs** (Years 1-5)

Funds have been budgeted in Years 1 - 5 for publication costs including, but not limited to, the production of posters, flyers, and other material associated with the dissemination of information regarding this project.

- **Consultant Services** (Years 1-5)

There are two consultants on this project. Consultant One, currently a postdoctoral fellow at Duke, will join University of Michigan as an Assistant Professor. Because of his transition, we have currently listed him as a consultant. Once he joins Michigan, he will be included as co-PI and a subcontract will be issued to University of Michigan. An expert in statistical modeling, machine learning, and optimization, he will play a critical role in this project by being at the interface of computation and stochastic modeling. He will contribute to both stochastic modeling and learning algorithms. He will be compensated, at approximately \$9,800/mo, for two FTE months in the first year and one FTE month in each of the following years. The grant will also support his travel to Duke and to the conferences listed above.

As a former postdoctoral fellow at Duke, Consultant Two worked with the PI, and played an important role in development of SLIP. We will need his expertise in integrating SLIP into this project. In particular, he will contribute to the development of emulator and its connection with the SLIP simulator. He is currently at the Smithsonian Institute in Washington DC. He will be compensated for a total of two months throughout years 1 and 2.

- **Computer Facilities Support** (Years 1-5)

Special-purpose facilities and services provided by the Computer Laboratory are essential to the accomplishment of the goals described in this proposal. The Laboratory provides research-dedicated hardware, including individual servers configured for research-grade computation, a cluster of computers for high-volume computation, a multi-terabyte, centralized data repository with mirroring and backup services, and other specialized research hardware; software for numerical and symbolic computation, database management, and data processing; and staff services for the installation, troubleshooting, renewal, and maintenance of these facilities. Computer lab staff also assists in setting up and maintaining web sites, data collection systems, and other mechanisms for the gathering and dissemination of data and educational materials related to research projects. These services and facilities do *not* include general-purpose equipment such as personal computers or printers, nor do they include general administrative or routine IT staff services.

Costs associated to these special-purpose facilities and services as shown in the budget are charged to all grants and contracts. When the Computer Laboratory, funded by Duke University, was established, it was agreed that the Department of Computer Science would provide an annual, budgeted amount of cost recovery from grants and contracts. The rate charged is calculated on the total cost to operate these facilities divided by total number of user months per year. The current rate for computational facilities fees is \$481 per Full Time Effort (FTE) month. For PIs, staff, and postdoctoral associates using these facilities, the rate is calculated based on the number of FTE months supported by the project. For Graduate students contributing effort to the project during the academic year, 1.0 FTE is limited to 19.9 hours of research effort each month, thus for each of the 9 months of the academic year only 0.5 the monthly rate for Usage Fees is charged. During the summer months, 1.0 FTE for students is calculated at 40 hours of research effort per week and the rate for this time and effort is calculated at the full monthly rate for the student that is supported by this project. This calculation is based on usual and customary usage of the facilities.

- **Tuition Remission** (Years 1-5)

Autumn, Spring, and Summer Semester tuition remission for Ph.D. research assistants is \$3,100 per semester for the 2013-2014 school year. These rates are set by the Graduate School and are applied consistently across the University, regardless of funding source. Three semesters of tuition remission are budgeted for each graduate student per year, prorated in cases of less than full-time effort. Although included in direct costs, tuition remission is excluded from Facilities and Administrative calculations.

Standard inflation rates of 4% are budgeted for tuition remission on September 1, in each of the out years.

Facilities and Administrative Costs (Years 1-5)

In accordance with Duke's negotiated rates, facilities and administrative costs have been charged as follows: 57% of the Modified Total Direct Costs (MTDC = total direct costs minus tuition remission and equipment costs) for duration of the project.