**Undergraduate Research Project**

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| **Project Name:** | Polyhedral development and polygon folding | **Number of Positions:** | 1–2 |
| **Supervisor:** | Shuyi Weng |
| **Supervisor e-mail:** | weng83@purdue.edu |
| **Project Description:** | Every polygon P can be companioned by many different cap polygons Q such that P and Q serve as two parts of the boundary surface of some polyhedron V. However, if a specific distribution of polyhedral angles is desired for the resulting polyhedron, there could be at most one cap polygon Q. A previous study [Sandu-Weng-Zhang, “Closed cap condition under the cap construction algorithm”] presented a necessary condition for the existence of cap polygon if V is to have equal polyhedral angle on all its vertices. This project focuses on one of the converse questions—for a given polygon P, which distribution of polyhedral angles can be realized from the cap construction? The project will begin with experimental mathematics, including both computational geometry and physically folding polygons into convex bodies. The observations from experiments will be used to help develop intuition and produce conjectures, hopefully eventually leading to rigorous proofs of new theoretical results.  |
| **Final Deliverables:** | Slide presentation, poster presentation, or conference presentation.Publication if results are promising.  |
| **Weekly Working Hours** | 5-10 |
| **For Credits/Voluntary** | Either |
| **Desired Qualifications** | Required: MA 265 (linear algebra) or equivalentPreferred: programming experience (not language-specific) |

**If you are interested this research project, please reach out to Shuyi Weng (weng83@purdue.edu) by November 30.**