

CHE 462: CFD Term Project

Focus should be on the following points

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|-------|--|------------|
| (i) | Good literature review (cite proper references) | 25% |
| (ii) | Theoretical formulation of the problem | 45% |
| | a. Schematic of the problem definition and assumptions | |
| | b. Governing equations and boundary conditions | |
| | c. State the feasibility of the problem formulation (Number of unknowns, Number of equations, Number of boundary conditions) | |
| | d. Physical significance of each equations with their characteristics | |
| (iii) | Solution techniques/discretization techniques can be used | 30% |
| | a. Numerical solution techniques | |
| | b. Discretize the governing equations and boundary conditions | |
| | c. Flow chart of the solution methodology | |
| (iv) | SOLUTION/SIMULATIONS NOT REQUIRED | |

Time Line (No Late Submission):

Team formation and topic selection: **9th March Mid-night**

Report Submission: **11th April Mid-night** **30%**

- Should not exceed **10 pages** (Strictly follow the page limit; **Points will be deducted with increasing page numbers**)
- Times New Roman, 12 points, Double spacing
- Page Layout: A4 with Moderate Margin

Power point Submission: **16th April Mid-night** **30%**

- Give **a voice over** in your PPT and make a video of **10 mins** (Strictly, PPT video should not exceed 10 mins timeline; **Points will be deducted if the video goes beyond 10 mins**)

Question-answer sessions (**10 mins**) for each group: **18th and 19th April** during the class schedule timing. **40%**

Possible Topics (You can choose any topic or sub-topic of your choice)

1. Droplet impact on solid surfaces
2. Droplet impact on deformable surfaces

3. Jet formation
4. Spraying (Spray cooling/Spray drying)
5. Turbomachinery (choose specific problems like, fluid flow behaviour in centrifugal pump, Air flow across compressors, fans, blowers ...)
6. Fluid flow morphology through channels or tubes (like, flow through closed microchannels, flow through microchannels in the presence of external fields like electric field or magnetic field, Flow through open channels, Flow through deformable channels)
7. Flow over bluff body (Air flow over a car/flight; Liquid flow over a solid geometry)
8. Mixing patterns in different reactors (CSTR, PFR, PBR ...)
9. Heat conduction in a solid body; Forced and Natural convection
10. Boundary layer separation
11. Shrinking core model
12. Droplet formation from a liquid jet; Droplet necking
13. Diffusion of solids in gas/liquids; Diffusion of gas in liquids
14. Residence time distribution (RTD) in different reactors
15. Effect of channel/tube geometry in fluid flows
16. Film boiling; Liquid evaporation
17. Magnus effect
18. Marangoni flows

Not more than 5 members in a team

Not more than 13 teams