Working in a cryptanalytic cell: A guide for students to function in a group and not hate it

Students often come into my class either without much experience working as part of a group, or otherwise hating group-work due to prior experiences. However, the simple fact of the matter is that learning how to work as part of a group is a fundamental skill that will be useful in the future, because the number of important, productive problems that are small enough for one person to handle all by themselves is very, very small. Also, contrary to popular belief, group work doesn't inherently suck. What sucks is poor planning and being frustrated. But it doesn't have to be that way.

Imagine three scenarios. All involve the same team engaged on the same project, which is composed of people that have different individual strengths and weaknesses. In scenario (1), everyone, by choice or design, ends up working on the part of the project that they are most uniquely bad at. In scenario (2), there are several team members (let's call them "As") that try to handle everything related to their individual strength, and the rest of the members ("Bs") are left to handle the rest. In scenario (3), the team determines how strategically best each team member's strengths can be utilized so as to be collectively most efficient.

Let us consider how these three scenarios will typically pan out. The expected result of (1) is that, well, nothing really gets done very well, and the overall result of the project will be poor. This is probably not very surprising. Scenario (3) will not end up perfectly, either. Real life is messy, people drop balls, and the team will not do as well as theoretically possible for a mega-entity with everyone's strengths, no one's weaknesses, perfect coordination, and unbounded time. But such an expectation is, of course, unrealistic, but the overall end product in Scenario (3) will likely be relatively good overall.

Scenario (2) is seductive by nature, and quite often actually occurs in real life. This scenario typically develops when there are one or several members, the As, who are more talented/available/industrious/competent/fast at some area of the problem, and take over all of that work, because why not have all of that work handled by the person who's best at it? But here's what typically develops from this strategy. The As largely determine everyone's workload and assignments by their own actions, rather than by group strategic planning. The As will then tire themselves out trying to handle everything (especially the voluminous easy but repetitive stuff), and resent their teammates for "not doing their fair share of the work". The Bs try to handle the rest of the stuff, irrespective of their individual strengths and weaknesses. The Bs end up working on, ironically, the hardest stuff, because those are the only tasks the As haven't immediately completed, and are largely unproductive on those tasks, because they are out of their depth. The Bs typically worry about seeming unproductive to their teammates, and frustrated at their own lack of progress. The Bs also typically end up resenting the As for being uncommunicative and uncooperative. The end result is an overall mediocre result with exceptional progress in some areas, but embarrassing failures in other areas, and everyone comes away hating group work.

Here are some ways to avoid Scenario (2) and succeed on a group-work task without hating everyone at the end:

1. Recognize that a group is required for the work because it is too complicated or massive for any one person, regardless of brilliance, to handle on their own, especially in the amount of time allotted.
2. Recognize the fact that not everyone is equally capable in all the same areas, but everyone has stuff they're good at, and everyone can help productively on the main tasks.
3. Have an initial meeting to strategize on how best to assign work such that that everyone is contributing more or less equally, and everything that needs to get done gets done.
4. Establish a common communications channel to keep team members up-to-date on how the project is going, and actually use it! (Physically arranging to meet up and work on stuff is often very helpful!)
5. Decide on leadership roles so that if something unexpected happens, someone can take charge and handle it. Here are some common leadership roles in a cryptanalysis cell:
    1. Cryptanalytical Strategy Officer - assigns the cryptanalysis of messages to appropriate individuals or groups, and keeps track of progress
    2. Logistics Officer - Tracks where people need to be and when, to ensure that operations can handled as efficiently as possible given everyone's schedules and time-commitments
    3. Asset Management Officer - Keeps collects and keeps track of material assets, and assigns, collects, and collates submission documentation.
    4. Tactical Operations Officer - Takes the lead on the planning and execution of tactical nerf operations and other boots-on-the-ground work.
    5. Chief Communications Officer - Responsible for monitoring and managing inter-team communications, the assignment of work related to that, and for managing the strategic planning of such communications or misinformation efforts.
    6. In groups assembled for other purposes, there will be a similar breakdown in roles. Often just with slightly different names.

The takeaway is that effective teams do not generally happen by accident. They require explicit, preemptive planning and organization. Highly effective teams are also much more pleasant and fun to be a part of. Do your part for the good of you all, plan, communicate, and keep these guidelines in mind, because if the team does well, you do well. Good luck.